Business Plan for the Candidate Watershed Project

4/20/05

Executive Summary: Cabinet Level

Introduction:

This business proposal has been prepared for the Executive Committee of the Bay Cabinet. The proposal will be used to request the Governor to direct that a unified and targeted watershed restoration process be developed and implemented by committing new and currently available funds to accelerate restoration actions in specified watersheds. The Corsica River watershed is proposed to be the first targeted watershed and the experience in the Corsica can serve as a template for the selection and restoration of subsequent watersheds. One outcome of the process will be to develop a mechanism to target future watersheds, develop future implementation plans and track both implementation, and water quality and living resources improvements. An evaluation and control framework to assess the success of this plan and future plans will also be developed. This proposal requests the following four actions at the Cabinet Level.

1. Endorse the acceleration of restoration activities in the Corsica watershed through this project.

2. Commit the resources to develop a detailed implementation plan for the Corsica River watershed within 90 days based on the recommendations in the Corsica Watershed Restoration Action Strategy.

3. Commit to continuing to seek investments and funding sources for this project, and ask the Governor to allocate new state resources.

4. Endorse the concept that the template developed through this project will be used as guidance for restoring subsequent watersheds

There are many benefits to be derived from these investments. Some of the benefits are described in detail below.

Benefits:

The approach outlined here will have many collateral benefits;

- Each State agency will develop first hand experience in all aspects of on-the-ground restoration coordinated and in partnership with local governments, SCD and local stakeholders as part of a locally developed restoration plan.
- Changes to local policy, code, and regulation in response to implementation needs and technical support will remain in perpetuity beyond the actual restoration work.

The program will identify and lead to the improvements in process efficiency, eliminating structural problems and implementation roadblocks.

- Funding gaps and sources , and opportunities to fill those gaps will be identified.

- A process to obtain future funding will be developed.

- Policies that sustain restored resources and water quality will carry protection efforts into the future.

Phased in Financial Commitment:

Phase 1: Dedicated funding and staff support to develop a full implementation plan in 90 days.

Phase 2: Dedicated funding and staff support for next 13 months. Secure $2,250,000 in funding for next fiscal year and begin implementing funded projects.

Phase 3: Dedicated funding and staff support to determine subsequent funding needs and develop funding sources for a total of $10,470,000 through fiscal year 2010 (2007 to 2010) and proceed with implementation as funds become available.

Phase 4: Plan to be reevaluated in Fall 2007

Justification:

In the past, the State has largely spread available restoration resources to all areas where restoration is needed. This has generally stabilized water quality or produced small improvements in many areas, but has not reached the point where a water body has been declared restored. The Corsica Watershed Project is a pilot program to develop best business practices and implement the processes, partnerships, assessment, and implementation tools needed to meet that threshold for restoring a single sub-watershed of the Chesapeake Bay. **The end point is to attain the new State water quality standards and remove the Corsica River from the Impaired Waters List (303(d) list) with an initial focus on nutrients and sediment, concurrent with planning and assessment to address the other impairments.**

More on the ground implementation action has been demanded by Maryland's citizens, EPA, the Tributary Teams, Local Governments, the Chesapeake Bay Citizens Advisory Committee, and the Chesapeake Bay Program. This project develops a foundation for demonstrating that measurable results can be achieved with a concentration of efforts. The business plan will drive the level of implementation and achievement needed with the capacity to sustain implementation into the future.

Selection Criteria:

Watersheds throughout Maryland were critically reviewed to determine appropriateness for a concerted state effort.

The following things were considered in the selection process;

Watershed size,
Potential to reduce Nutrient Loadings,
The potential to upgrade wastewater treatment plants to Biological Nitrogen Removal,
The presence of a Watershed Restoration Action Strategy,
The results of the Unified Watershed Assessment,
Existing impairments listed in Category 5 of the 303-d list,
The presence of a Total Maximum Daily Load (TMDL),

SAV restoration potential,
Oyster restoration potential,
Biological Restoration Potential.
Willing local partners

Selection Assessment and Analysis

Taking these factors into account, staff assessed the 139 "8-digit" watersheds in Maryland. These watersheds were deemed to be sufficiently large to provide a meaningful demonstration, but not so large as to impose impossible resource needs over a reasonable time frame. A smaller number of watersheds were chosen for more detailed analysis: Breton Bay, Corsica River, Miles River, and Port Tobacco. The relevant factors are listed in Appendix A. After assessment of the factors listed above and other factors, DNR, MDE , MDA, and MDP reached a consensus that the Corsica River provided the best opportunity for a demonstration of the principles and processes needed for success.

Justification for Selection

In evaluating the Corsica watershed verses the other candidate watersheds that met the projects overall purpose, it became clear that this watershed provided the best opportunity for a successful restoration effort. This was based upon the relative magnitude of effort that would be needed as outlined in the nutrient TMDL and the amount of nutrient reduction practices already implemented in the watershed. The Corsica watershed also provides an opportunity to go further based upon specific management activities identified by the Corsica Watershed Action Strategies team. The real potential to implement the management options as outlined makes it possible to address the funding needs over a reasonable timeframe. In addition, we believe there exists a good group of willing stakeholders and the basic infrastructure to carry out the various options. Finally, because the water quality of the watershed is improving we can focus more on the aquatic restoration options of the plan while maintaining our current momentum in implementing improvements to the landscape.

Summary of impairments, implementation activities and water quality criteria

The water quality impairments, criteria or goal used to measure success, the level of implementation needed and predicted dates for meeting the criteria are presented in Table 1. Column one in the table presents the impairments and status of the TMDL for the impairment. Column two presents the water quality criteria or goal related to fixing the impairment. Columns three and four describe the best management practices (BMPs) and extent of BMP implementation needed to address the impairment and the dates currently predicted for meeting the criteria. The prediction for meeting the criteria will continually be re-evaluated based on implementation tracking and monitoring results throughout the project. To completely restore this watershed, i.e. remove it from the impaired waters list, all of these impairments must be addressed. It is therefore important to set accurate expectations as to what will be achieved and by when.

Table 1: BMPs and Policies Used to Address the Impairment And Meet the Standard

Impairment	Water Quality Criteria (goal)	Level of BMPs needed to address impairment and meet the criteria	Prediction for meeting criteria
Tidal Nutrients (nitrogen and phosphorus) 303(d) list TMDL approved	Chlorophyll a concentrations of 50 ug/l (see COMAR; Use II – Shallow and Open Water uses and Use II – Shallow Water criteria for water clarity for details). Pending - dissolved oxygen concentrations visa vie Bay Program Office segmentation scheme	Agricultural and urban controls including: upgrade of sewage treatment plant in Town of Centreville, pet waste ordinances, street sweeping, retrofit of stormwater controls, **4000** acres of cover crops annually, stream fencing, homeowner education, **100** acres of forested or grass stream buffers on ag lands, **200** acres of forest conservation , reforestation and forested buffers on residential lands, **50** acres of wetland creation, **30** spetic denitrification retrofits, **50** acres of horse pasture management, etc.	BMP implementation: 2005 – 2008 Criteria achieved: 2008+
Non tidal Biological degradation in 2 sub-watersheds 303(d) list	Narrative criteria supporting living resources (see COMAR Use I – Water and habitat quality so aquatic life communities will meet reference conditions). Index of Biological Integrity (IBI) scores.	**2** miles of stream restoration and habitat creation, stormwater controls, stream fencing, 100 acres of forested or grass stream buffers on ag lands, 200 acres of forest conservation and reforestation and forested buffers on residential lands,, etc.	BMP implementation: 2005 – 2009 Criteria achieved: 2010+
Tidal Sediment 303(d) list TMDL will be developed out of the CBP version 5 model in 2008	Clarity via secchi disc or submerged aquatic vegetation abundance, (see COMAR Use II – Shallow Water criteria for water clarity due to excess turbidity). Corsica is included in the proportion of the lower Chester River SAV goal.	Agricultural and urban controls including: pet waste ordinances, street sweeping, retrofit of stormwater controls, 4000 acres of cover crops, stream fencing, homeowner education, 100 acres of forested or grass stream buffers on ag lands, 200 acres of forest conservation , reforestation and forested buffers on residential lands, 50 acres of wetland creation, etc.	BMP implementation: 2005 – 2009 Criteria achieved: 2010+
Tidal Toxics for PCB and one other pollutant 303(d) list TMDL scheduled for 2008	Levels of PCB in fish tissue.	Legacy pollutant. Impairment not resolved. May be able to control a limited amount through non point source inputs from storm water and point source controls at wastewater treatment plant.	Legacy pollutant. Continue issuing fish consumption advisories.

Tidal Bacteria – fecal coliform – will be tracking bacteria type to determine specific sources. 303(d) TMDL scheduled for 2007	Shellfish criteria of 14 fecal coliform per 100 milliliters (see COMAR; Use II – Shellfish harvesting areas; 26.08.02.03-3C for details).	Upgrade of sewage treatment plant in Town of Centreville. Pet waste ordinance, horse pasture management and manure management.	Centreville wastewater treatment plant upgrade, including spray irrigation, is underway. Criteria achieved: 2007+
Tidal Probable Clarity impairment 2006	Clarity impairment can be addressed with SAV restoration	Clarity impairments have never been addressed before and are dependent on many things not under management control. Storms in particular, that destroy large areas of Bay grasses and annual precipitation, that controls nutrient levels to some extent and directly water clarity, will both greatly influence the potential for attainment. Collateral benefits from sediment, biological and nutrient controls will help meet clarity goals.	

Resources needed

Funding is a key consideration. The state agencies, with DNR as the lead, will work with watershed stakeholders and the Environmental Finance Center and the Governor's Office on preparing a comprehensive financial plan to support 13 months of work. Ongoing relationship development with our funding partners will also be proposed to expedite the financial commitments to move future targeted watersheds more efficiently through the resource allocation challenges.

Human resource management and development are integral to the success of the project. The staffing needs, training, overhead and development of future teams will be integrated into the financial requirements. An organizational structure will be developed addressing the requirements to implement the WRASs, or other watershed plans, and the strategies outlined in the proposal. The structure is going to need human resource commitments from the State departments that would link key stakeholders like our funding and constituent partners. This structure will be proposed in the first implementation steps that provide the accountability, authority and responsibility to execute the pilot as planned.

How Much Is It Going To Cost?

The implementation activities, total costs, available funds, and the funding gap are presented in Table 2. Total costs were based on the implementation levels needed to meet water quality criteria presented in Table1. Available funds were based on the current program expenditures in the Corsica River watershed. The funding gap is funds currently unavailable.

Table 2: Implementation costs, available funds and the funding gap for meeting water quality criteria in the Corsica River watershed.

Implementation Activity	Cost in Millions	Available Funds	Funding Gap
MDE			
Point Source ENR	$1.11	$1.11	
Stormwater management	$1.25		$1.25
Septic Retrofits	$0.20	$0.20	
Sub Total	**$2.56**	**$1.31**	**$1.25**
MDA			
Maryland Agricultural Cost Share	$0.08	$0.08	
Horse Operation Cost Share	$0.35		$0.35
Cover Crops	$0.80		$0.8
Forest/Grass Buffers	$0.37	$0.37	
Staff Support	$0.60		$0.6
Sub Total	**$2.20**	**$0.45**	**$1.75**
DNR			
Oysters	$0.9		$0.9
SAV	$0.16		$0.16
Urban Forest Buffers	$0.22		$0.22
Urban Wetlands	$1.0		$1.0
Stream Restoration	$2.0		$2.0
Sub Total	**$4.28**		**$4.28**
Evaluation (MDE-DNR)	$2.7	$0.7	$2.0
Sub Total	**$2.7**	**$0.7**	**$2.0**
Project Total	**$11.74**	**$2.46**	**$9.28**

Funding Sources

This project will cost an estimated $11.74 million dollars of which an estimated $2.46 million is currently available. The remaining funds will need to come from a combination of Federal, State and local sources. For this project to be successful new funds need to be secured. A reallocation of funds from existing programs with statewide mandates only weakens the statewide Bay Restoration effort. Federal funds can be pursued for some of the implementation and evaluation activities, but sustainable fund sources need to be obtained or developed for activities that are long term commitments towards staff support, annually renewed incentive payments and evaluation activities. A list of potential existing fund sources is presented in Appendix C. EPA's Chesapeake Bay Targeted Watershed Pilot Program is a new source of Federal funding directed specifically at the Bay that seems to fit well with this project and should be pursued.

Federal funds through the Maryland State Highway Administration for wetland restoration and stream restoration are another potential source that could be targeted.

Marketing

The analysis attached is the constituent research required in a business proposal (usually disclosed in a business plan under Marketing). From this start we are using the Corsica as a test market to prepare for developing a generalized implementation business model for all other impaired watersheds. We will be adding a comprehensive communications plan to develop a consistent and unifying message that promotes the pilot program, assesses the project and process to ensure that it is meeting the constituents and stakeholder needs, communicates project status and, reaches various levels of the interested market segments.

Project evaluation

A comprehensive evaluation and control mechanism will be established that helps us not only monitor meeting program end goals and milestones but provides the feedback necessary to enhance the success of future watershed restoration projects. The evaluations will be designed accommodate adjustments in the planned course of action when needed and to provide guidance for future success. This would include an approach to capturing full costs related to the pilot and ensure accurate estimates of future costs for successive watershed implementation projects.

Reevaluation in 2007:

The reevaluation of this project will be based on adaptive management using implementation tracking and monitoring data as feed back. The reevaluation will determine the progress the project is making towards implementation goals by tracking implementation and funding acquisition and expenditures. Progress towards meeting water quality criteria will be determined using water quality data, SAV coverage and survival data, and oyster survival and population estimates. Course corrections in the implementation program will be made based on implementation participation levels, success in securing funds, adequacy of funding and the water quality and living resource response.

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The Bay Restoration : Demonstrating Results

Baywide Water Quality Problems

The Chesapeake Bay is America's largest estuarine system and the lifeblood of Maryland's economy. The Bay has historically supported a rich and complex ecosystem. The bottom of the Bay was dominated by oysters and submerged aquatic grasses. Oysters formed reefs that added to the complexity and diversity of the Bay bottom and filtered enormous volumes of water while feeding. Submerged aquatic vegetation covered several hundred thousand acres of bottom and provided nurseries for crabs and fish. The water column teamed will fish and crabs and enormous flocks of migratory birds used the Bay as a stop over.

In the mid-20th century, concerned citizens began to take notice of troubling signs in the Bay. Diseases were killing oysters, water clarity started declining, algal blooms became more frequent and the submerged aquatic grasses began to decline.

The oyster population in the Bay is currently at a historic low, SAV beds cover approximately 30% of their historic coverage and water quality remains impaired by excess nutrients, sediments and toxic chemicals.

A significant effort has been underway for the past 30 years to understand the Bays problems and address them. Considerable resources have been committed to assessing the issues, developing a restoration plan and implementing it. The responses to the effort to date have been limited.

One of the largest impediments to the rapid forward progress of the Bay restoration effort is the estimated cost. Full implementation of the management activities proposed in the Maryland portion of the Chesapeake Bay has an estimated cost of 12 billion dollars. Given the size of the watershed and the time it will take for various restoration activities to have an effect, the response to such an expenditure could take decades.

Scaling the effort down and applying a restoration program, similar in the level of effort but focused in a smaller watershed, has the potential to be able to demonstrate results on a shorter time scale and help define the level of effort needed.

Selection Criteria for the Candidate Watershed Project

The goal of this exercise was to select a watershed where, given sufficient resources, the State, County and local governments could demonstrate the ability to implement sufficient restoration activities to significantly improve habitat and water quality for living resources and maintain those improvements.

In the past, the State has largely spread available restoration resources to all areas where restoration is needed. This has generally stabilized water quality or produced small improvements in many areas, but has not reached the point where a water body has been declared restored. The Candidate Watershed Project , is a pilot program to develop and implement the processes, partnerships, assessment, and implementation tools needed to meet that threshold for a single sub-watershed of the Chesapeake Bay.

The restoration of a watershed, leading to improved water quality that meets State Water Quality Criteria, is a complex multidisciplinary challenge that entails the consideration of many factors. In evaluating watersheds for possible selection the following criteria were used;

Watershed size,
Potential to reduce Nutrient Loadings,
Potential to upgrade wastewater treatment plants to Biological Nitrogen Removal,
Presence of a Watershed Restoration Action Strategy,
Results of the Unified Watershed Assessment,
Existing impairments listed in Category 5 of the 303-d list,
Presence of a TMDL,
Potential for SAV restoration,
Potential for Oyster restoration,
Potential for Biological Restoration,
Potential for local capacity, engagement and political interest.

The spreadsheet used for the selection process is presented in Appendix A. A more detailed explanation of several of the criteria is presented below.

Nutrient Reduction

The science that has been developed over the last 15+ years in the field of watershed restoration indicates that point sources, non-point sources, watershed size and the level of implementation of management practices need to be taken into account when trying to effect and document the restoration of water quality in a watershed. Point sources can be addressed at the source given funds and time for planning and construction. The changes in point source pollutants can be measured at the source and the differences before and after can be directly attributed to the upgrade.

It is much more difficult to control non point source pollution and to monitor and assess actual load reductions and effectiveness. Non point source pollutants are moved during rainfall events and the rate of movement and the volume of pollutants moved is not consistent from one storm to the next. To address non point source pollutants and demonstrate that the controls are effective, natural variability in the weather, travel time of pollutants in ground water or through a watershed, storage of pollutants in the soil, groundwater, or in stream all need to be taken into consideration. These variables make the scale of the undertaking of paramount importance. Larger watersheds are slower to react to changes in non-point source pollutants, and the larger a watershed, the harder it becomes to implement restoration activities on a scale large enough to create a change. The scientific literature suggests that 60% or more of the landscape needs to be treated to reach the critical mass needed to cause an effective change in non point source pollutants (Maas et al. 1988, Johengen et al. 1989, Wolf 1995).

Given these facts, three primary considerations in the development of this project stand out; watershed size, time needed to see a response, and the concentration of management activity. Each of these considerations is explained in detail below:

1. First, the project needs to be focused in a relatively small watershed. Our success in demonstrating results in watersheds larger than 30,000 acres has been low. Based on the experience gained from the Targeted Watershed Project (1990), 30,000 acres should be the upper size limit.

2. Second, allowing enough time for the project to develop will determine our ability to demonstrate the effect of the project on water quality. If the project is heavily dependant on non point source nutrient reductions, then the time frame for the project needs to extend between 8 and 10 years. USGS indicates that groundwater residence times in the surficial aquifer are between 5 and 10 years. It is estimated that any changes in nutrient concentrations in shallow groundwater caused by this project will take at least that long to become apparent in surface waters. If the project is primarily dependant on nutrient reductions from a point source and the point source is being addressed then the time frame for the nutrient reduction could be shorter.
3. Finally, the level of implementation activity has to be on a scale large enough to cause a change in the volume of pollutants discharged to the targeted water body while still meeting the size constraints indicated in (1) above.

SAV Restoration

The criteria for submerged aquatic vegetation (SAV) restoration is to select watersheds with water bodies where SAV beds can be established or expanded. Potential restoration sites are identified by assessment of existing habitat information including but not limited to water quality, substrate, proximity to existing SAV beds and protection from hydraulic clam dredging activities. Potential sites passing initial criteria are then evaluated with two years of spatially intensive habitat surveys and two years of site-specific habitat surveys (test plantings, intensive monitoring, additional assessments) to ensure that the site is suitable for larger scale planting or seeding. The goal of SAV restoration is to jump-start local populations by restoring SAV in suitable areas currently devoid of SAV. In cases where a site is currently vegetated by one species, opportunities may exist to increase species diversity or reintroduce indigenous species.

Oyster Restoration

The criteria for the oyster restoration component is to select watersheds with water bodies where oysters and other bivalves will survive and reproduce. The goal of this project is to establish a reproducing oyster population large enough to improve water quality and ultimately provide an economic resource. The preferred salinity range for reproduction of oysters is between 10 and 30 ppt. Hard bottom is the preferred substrate.

New water quality criteria due to be promulgated this summer will include, for the first time, criteria for water clarity required to provide adequate habitat for submerged aquatic vegetation (SAV). Water clarity is the complex product of suspended algae and sediments. It is likely that many areas of the Bay and lower tributaries will subsequently be found to exceed these new criteria. Filter feeders such as oysters have been demonstrated to have a very significant effect on water clarity when the number or volume of oysters is sufficient for the volume of water to be cleared. Given the complexity of factors effecting water clarity it is critical that the State develop an understanding of our ability to improve water clarity by managing “ecosystem services” such as oysters. Consequently, the chosen watershed should provide the ability to develop habitat and populations that would enable the growth of an ecologically relevant volume of oysters.

Assessment and Analysis

Taking these factors into account, MDE and DNR assessed the 139 "8-digit" watersheds in Maryland. These watersheds were deemed to be sufficient large to provide a meaningful demonstration, but not so large as to impose impossible resource needs over a reasonable time frame. A smaller number of watersheds were chosen for more detailed analysis: Breton Bay, Corsica River, Miles River, and Port Tobacco. The relevant factors are listed in Appendix ?. After assessment of the factors listed above and other factors, DNR, MDE , MDA, and MDP reached a consensus that the Corsica River provided the best opportunity for a demonstration of the principles and processes need for success.

The Corsica River

The Landscape of the Corsica River

Land use in the Corsica River watershed is approximately 64% agricultural, 28% forest/scrub shrub and 7% developed. Wetlands identified by DNR comprise less than 0.5% of the landscape. The watershed has low population density (0.15 people/acre) and has little impervious cover except in and around the Town of Centreville. About two-thirds of the watershed is prime agricultural land and about one-fifth is hydric soil. All other soils amount to about 13% of the watershed. Approximately 81% of the 2,600 acres of wetlands identified in the watershed are classified as palustrine forested wetlands.

Natural resource lands of statewide or regional significance, identified as Green Infrastructure Hubs, occur in four areas. Connections between these hubs are mostly forest and agricultural land. Land protected from development encompasses 8% of the Corsica River watershed including conservation easements, agricultural easements and County Parks/open spaces.

The Water Quality Problems of the Corsica River

In the tidal waters of the Corsica River either nitrogen or phosphorus can become too readily available. When this occurs under certain conditions with warm weather, sufficient light, etc., algae populations can grow to excessive levels. The results are the same as in the main Bay, the algae crowd out other small organisms, cloud the water limiting light penetration, and eventually die-off consuming the dissolved oxygen that other aquatic life needs to survive.

Fecal coliform concentrations in portions of the Corsica River are high enough to affect shellfish harvesting regulations. The tidal waters closest to Centreville are "restricted" which "means that no harvesting of oysters and clams is allowed at any time." The harvesting is restricted to prevent consumption of contaminated food.

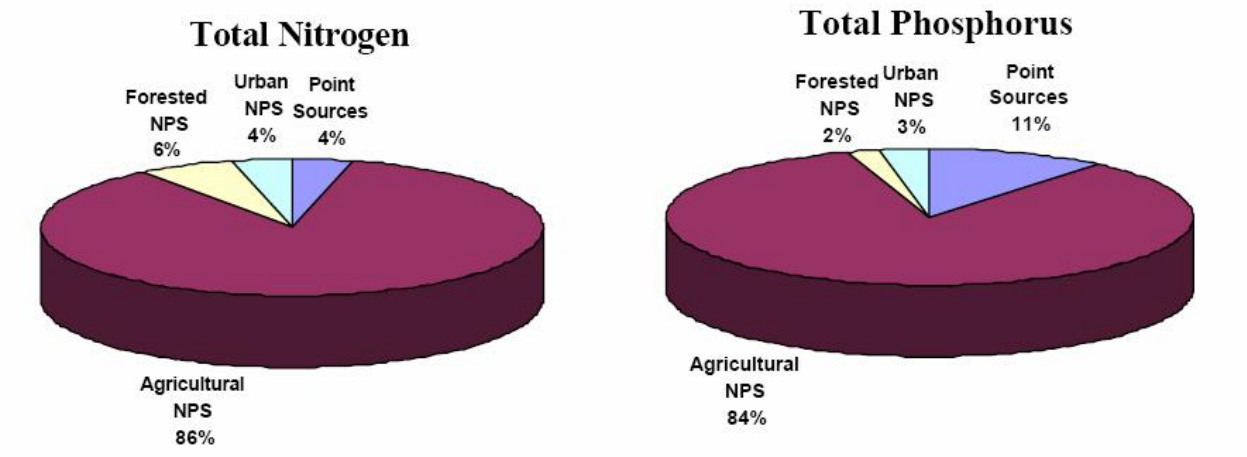
The tidal portion of the Corsica River also suffers from excessive amounts of suspended sediment and Polychlorinated Biphenyls (PCBs) and Dieldrin. The suspended sediments are considered pollution because they can inhibit light penetration, prevent plant growth, smother fish eggs, clog fish gills, etc. The PCB's and Dieldrin are associated with toxic and carcinogenic effects in humans. Since there is a risk that health problems could occur in people who eat these local fish too frequently, fish consumption advisories were issued in late 2001 and an update to

the advisory was issued by MDE in January 2003. The purpose of the advisory is to recommend that human consumption of channel catfish from the Chester River/Corsica River area be limited.

The major tributary streams, Three Bridges Branch, Gravel Branch and Mill Stream Branch are classified as Use I for contact recreation and aquatic life. The impairments to this use is biological limitations (poor or very poor benthic organism populations/conditions).

A base flow water quality survey was completed during March 2003 in the non-tidal portion of the Corsica watershed. Nitrate/nitrite concentrations were found to be excessive (> 5 mg/L) in 10% of the sub-watersheds and high (>3 and <5 mg/L) in 40% of the sub-watershed. Excessive concentrations of orthophosphate (> .015 mg/L) were found in 30% of the sub-watershed, and high concentrations (> .01 and < .015 mg/L) in an additional 30% of the sub-watershed. The elevated nitrate/nitrite concentrations and/or yields appear to be associated with row crop agriculture and possibly residential developments with onsite sewage disposal. The elevated orthophosphate concentrations and yields appear to be associated with systems that had fine suspended sediment loads lingering in the water column several days after rain events possibly due to drainage from ponds.

A Total Maximum Daily Load (TMDL) approved for both nitrogen and phosphorus in the tidal portion of the Corsica River sets load limits for both nutrients. The largest nutrient loads in the watershed occur from agriculture. However, the 2003 TMDL's monitoring and subsequent implementation plan point to discharges at the WWTP as the source of the current impairment. The point source nutrients contribution is relatively small and is anticipated to be significantly reduced now that land application of treated sewage effluent from Town of Centreville's Wastewater Treatment Plant has begun. There is significant, on going, agronomic and structural BMP implementation on farm acreage in the watershed. This provides a margin of safety should the point source loading reduction not meet the TMDL's water quality goals. Follow up monitoring of water quality conditions is scheduled by MDE to occur the fall of 2005.



(MDE 2000)

Living Resources and Habitat

Anadromous fish spawning areas for white perch, yellow perch and herring have been identified in the Corsica River mainstem and three major tributaries. Nontidal fish species identified in the watershed are mostly tolerant and moderately tolerant of poor or variable water quality and habitat conditions. However, two intolerant species, roseyside dace and least brook lamprey,

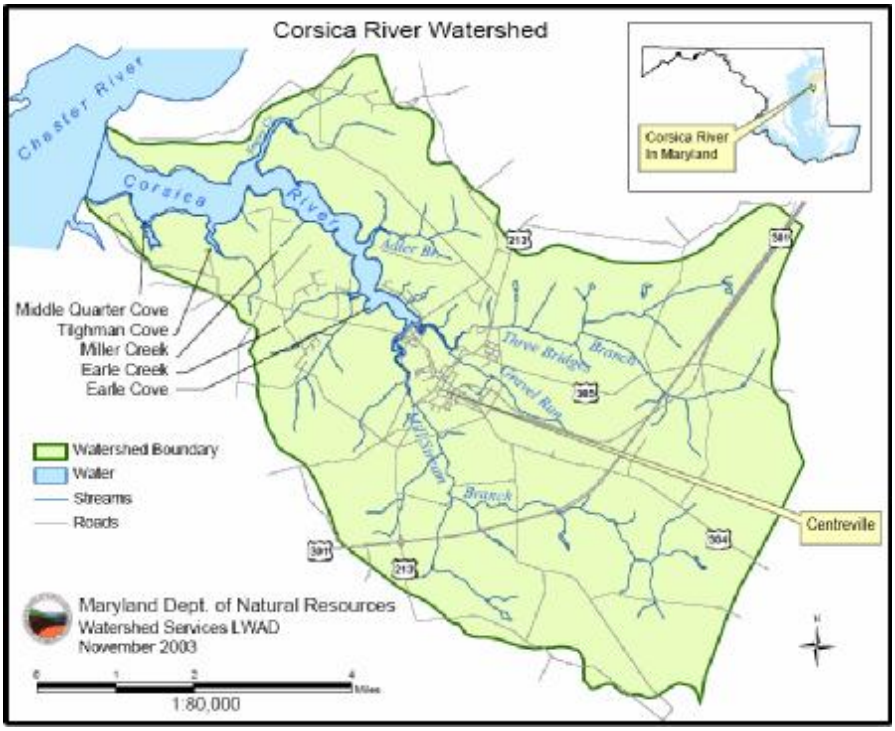
found in limited stream segments indicate that good water quality and good habitat conditions coincide in these small areas.

Benthic macroinvertebrate collections in the fresh water tributaries also indicate variable habitat conditions and potentially variable water quality throughout.

Natural oyster beds that were documented below Ship Point shortly after the turn of the century in the Corsica River no longer exist there. However, there is a remnant oyster bed at Ship Point that is still listed on DNR's oyster charts.

Submerged aquatic vegetation (SAV) in the Corsica River has only been identified using aerial photography in a few limited areas near its confluence with the Chester River. Its most frequent location since 1990 has been in Middle Quarter Cove.

The bald eagle is the only sensitive terrestrial species tracked by Maryland that is currently identified in the Corsica River watershed.



Justification for Selection

In evaluating the Corsica watershed verses the other candidate watersheds that met the projects overall purpose, it became clear that this watershed provided the best opportunity for a successful restoration effort. This was based upon the relative magnitude of effort that would be needed as outlined in the nutrient TMDL and the amount of nutrient reduction practices already implemented in the watershed. The Corsica watershed also provides an opportunity to go further based upon additional options as identified by the Corsica Watershed Action Strategies team. The real potential to implement the management options as outlined makes it possible to address

the funding needs over a reasonable timeframe. In addition, we believe there exists a good group of willing stakeholders and the basic infrastructure to carry out the various options. Finally, because the water quality of the watershed is improving we can focus more on the aquatic restoration options of the plan while maintaining our current momentum in implementing improvements to the landscape.

Readiness to Proceed

Significant planning and implementation activities have been undertaken in recent years that were used to inform the selection process and will provide for more rapid movement into the restoration phase. Completion of Total Maximum Daily Loads (TMDLs) and Watershed Restoration Action Strategies in particular, provide a distinct advantage for selection.

Also critical is the establishment or existence of significant stakeholders willing to work in partnership with the State agencies to achieve the aims of this project.

Citizen and Stakeholder Involvement in the Corsica

Stakeholder participation is an important dimension of the WRAS process for at least three reasons. First, a broad based group brings a breadth of knowledge of the landscape and its history and current condition. Although maps and GIS are wonderful, they cannot replace personal knowledge of an area. Secondly, a broad based group helps season the plan development process with a variety of points of view - a variety that is hard to achieve by County staff alone. This broad base helps incorporate differences and diminishes polarization. Finally, a Steering Committee process plants the seeds for partnerships, shared problem solving and shared resources, all of which are important to WRAS plan implementation.

Kay Schultz, Monocacy WRAS
Watershed Coordinator
Frederick County Maryland

Selection of any watershed in which the state would like to concentrate its efforts is, in large part, driven by local participation. In past experiences with watershed implementation efforts, the state has learned that with out the buy-in of local governments and stakeholders, no amount of state dedication can create a significant change in a watershed. Local government information, local knowledge, and stakeholder concerns must all be considered in the analysis that leads to subsequent management decisions articulated in a watershed management plan. Stakeholder participation is the key to the successful application of a state initiative in any watershed. Thus, in addition to technical justification, the Corsica is a logical selection for this watershed effort due to (1) local involvement in the development of a Watershed Restoration Action Strategy (WRAS) and (2) because of a strong, well developed, and presently engaged stakeholder group, and (3) because of local political interest.

The Corsica WRAS was developed in 2003 and completed at the end of 2004. The Town of Centreville initiated the proposal application for the WRAS and submitted it to the Maryland Department of Natural Resources through a competitive grants process, in the summer of 2002. The Town was awarded the grant at the end of 2002 which included, in addition to $40,000 of

discretionary funding, a part time coordinator, a 100-mile stream corridor assessment, extensive water quality and benthic analysis in the streams of their choice, and a document that characterized the key attributes of their watershed. These technical services were provided by DNR.

In the Corsica watershed, during the development of the WRAS, the Town of Centreville collaborated closely with Queen Anne's County and established a core Working Group made up of interested parties and key stakeholders. The Working Group was made up of about 20 people from all sectors of the community and included representatives from non-profit environmental groups, farmers, citizens, elected officials, and the Soil Conservation District.

As a WRAS grant "deliverable", the Town was required to produce a strategy for managing their watershed. The strategy contained a suite of management practices and program changes that once implemented would improve both the water quality and habitat of the watershed. The final WRAS document was developed and written by all the stakeholders.

Description of Impairments

The Corsica River was identified on the State's 1996 list of water quality limited segments (WQLSs) as impaired by nutrients, due to signs of eutrophication as well as fecal coliform and suspended sediment. High chlorophyll-a levels were used as evidence of elevated N and P concentrations in the Corsica River. The 2004 draft 303(d) list, Category 5, decoupled the sub-watersheds to the Corsica River and listed them separately. The three sub-watersheds are all listed based on biological impairments. The listings are based on the macroinvertebrate and fish indexes developed by the MBSS program. The indexes show poor ratings for the macroinvertebrate index in all three streams.

Nutrients

Impairment

The Corsica River was identified as being impaired by nutrients due to signs of eutrophication. Eutrophication is the over enrichment of aquatic systems by excessive inputs of nitrogen and phosphorus**,** and was evidenced in the Corsica River by high chlorophyll-a levels. Land development as well as the addition of point source discharges can increase the rate of eutrophication to problematic levels. Highly eutrophic waters will characteristically have fewer species present, and particularly high concentrations of algae. Due to the algae**,** dissolved oxygen levels are likely to fluctuate between day and night, which can cause fish kills. High concentrations of algae and wide fluctuations in dissolved oxygen can interfere with the designated uses for the Corsica River, and therefore cause a violation of the water quality standards of the State. For these reasons, this document will address high levels of nitrogen and phosphorus, to control chlorophyll-a concentrations (a surrogate for algal blooms) and to maintain dissolved oxygen standards.

The upper reaches of the Corsica River are impaired by an over enrichment of nutrients. Nitrogen and phosphorus loadings from both point and nonpoint sources have resulted in persistent seasonal algal blooms, observed and documented by MDE, in the reach from the Watson Road Bridge on upstream to the tidal boundary (MDE 2000). Mean summer

concentrations of chlorophyll-a in that region typically fall above 70 µg/l, with nuisance algal bloom levels periodically reaching 146 µg/l.

Targeted Water Quality Goal

The objective of the TMDLs for nitrogen and phosphorus for the Corsica River is to reduce nutrient inputs to a level that will ensure the maintenance of the dissolved oxygen standards and reduce frequency and magnitude of algal blooms. Specifically, the TMDLs for nitrogen and phosphorus for the Corsica River are intended to:

1. Assure that a minimum dissolved oxygen of 5 mg/l is maintained throughout the Corsica River system, and,
2. Reduce peak chlorophyll-a levels (a surrogate for algal blooms) to below 50 µg/l. (1)

The dissolved oxygen goal is based on specific numeric criteria for Use I & II waters set forth in the Code of Maryland Regulations 28.08.02. The chlorophyll-a water quality goal is based on the designated use of the Corsica River, and guidelines set forth by Thomann and Mueller (1987) and by the EPA *Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part* (1997).

Activities Needed to De-list

The implementation of point source nutrient controls will be executed through the use of NPDES permits. The NPDES permit for the Centreville WWTP, which is the only plant discharging to the Corsica River, has required implementation of Biological Nutrient Removal (BNR) and Chemical Phosphorus Removal (CPR). The NPDES permits for Centreville and the other point sources in the Corsica River will have compliance provisions, which provide a reasonable assurance of implementation.

Maryland's resultant Tributary Strategies for Nutrient Reduction provide a general framework that will support the implementation of nonpoint source controls in the Lower Chester Tributary Strategy Basin, which includes the Corsica River watershed. Maryland is in the forefront of quantifying nonpoint source controls through the Tributary Strategy efforts. In addition, Maryland is refining its State Nonpoint Source Management Plan, required under Section 319 of the Clean Water Act, through which the Tributary Strategy and other nonpoint source control efforts can be integrated.

Biology

Impairment

Three sub-watersheds of the Corsica River are threatened or impaired:

- Sub-watershed (021305070395), includes Emory Creek, is actually listed in category 3a meaning that it is not impaired and thus does not need a TMDL, but that data were equivocal and not sufficient to determine impairment status. Basically, it may or may not be impaired and we don't have enough data to know either way.
- Sub-watershed (021305070396), Mill Stream, is listed as impaired at station CORS-106-R-2000 for failing the benthic index. However, there is another station CORS-205-R-2000 in the same watershed that shows up good, suggesting the impairment may be localized.

- The same situation described above applies to the third sub-watershed (0213050070397), Three Bridges and Gravel Run. However, in this case two stations showed poor benthic scores while one turned up good.

Activities Needed to De-list

The major impediments are (1) a lack of certainty as to the attainment status in three sub-watersheds and (2) a lack of clear understanding of the stressors that need to be mitigated to remove the biological impairments from 303d list. The first impediment can be addressed by additional monitoring. To address the second impediment MDE, a private contractor and EPA are currently working to address several critical components necessary for the practical application of the biostressor concept, but it may be one to two years before acceptable results are achieved. The critical components include establishment of a comprehensive data set (STORET?), refinement of species tolerance criteria (build table of tolerance values), compilation of the decision matrix, and development of appropriate weighting factors for the diagnosis section of the MDE model.

In the meantime, it seems likely that activities to reduce nutrients and sediments will improve conditions for the biological measurements and result in progress toward improving water quality as the stressor identification methodology is developed and tested. Subsequently additional controls may be identified as necessary for sediments, hydrology, or nutrients to achieve the desired conditions. Biology is usually monitored using a random sampling design. This should continue, but with a denser sample allocation to this watershed to better track progress.

Resources should be allocated to provide for additional or targeted sediment controls focused on biologically degraded areas, stormwater retrofits and/or stream restoration, and possibly additional nutrient controls.

The following milestones and metrics will be key to achieving our goals:

1. Complete additional monitoring to clarify status of water quality attainment.
2. Complete biostressor methodology
3. Apply biostressor methodology and determine primary and secondary causes of degradation.
4. Identify and quantify remedial actions necessary to reach attainment.
5. Progress metric: annual monitoring to determine current IBI values.

Sediments

Impairment

Sediment in streams has many origins. Rainfall carries sediment from bare or disturbed ground. Sediments eroded from stream banks and streambeds during rainfall, particularly in areas where impervious surfaces (streets, roofs, etc.) prevent absorption of the rainfall causing very rapid increases in high velocity flows in streams. Both the erosion processes and the resulting sediment cause water quality problems. Erosion of stream banks destroys and degrades habitat by eating away at riparian buffer areas and disturbing stream flow characteristics. The sediment resulting from these processes settles in streambeds degrading habitat for organisms that require coarser substrate, thus excess sediments are often a critical component of the biological impairments

discussed above. Sediments also contain high amounts of phosphorus, exacerbating nutrient impacts. Finally, sediment reduces water clarity, which in addition to being unsightly, destroys estuarine habitat for submerged grasses, a critical habitat for juvenile fish and crabs. Since sediment sources are so diffuse and widespread, the impairment is listed for the entire watershed, rather than individual sub-watersheds as is done for biological degradation. However, the impairment is based excess sediment loads to Chesapeake Bay. Although water clarity is not currently listed as impaired because the clarity standard is pending promulgation of the new water quality standards, it is likely that there will be a listing for the tidal portion of the Corsica River when the appropriate monitoring is completed.

Partial sediment load allocations to protect the Bay have been assigned to the larger Tributary Basin based on phosphorus controls. The allocation needs to be refined and properly allocated to the Corsica River. In addition, shoreline erosion for the tidal portion of the river needs to be quantified and appropriate load reductions identified.

Activities needed to de-list

A quantitative plan for sediment controls will probably not be available generally for the Corsica River until 2007 when the Bay models are upgraded. MDE plans to use the revised Bay watershed model to quantify sediment loads for TMDL development. In the interim two activities will provide significant progress:

1. Agricultural and other nonpoint source controls on phosphorus will also serve to reduce sediment loads. Nutrient management plans and soil and water conservation plans will be particularly applicable. Wildlife and horses are the dominant animal populations in the Corsica watershed. There are also a number of horse farms in the watershed, which if not properly managed can result in excess sediment, nutrient and bacteriological loads. These horse farms have not been quantified as a problem, but will be investigated as a possible controllable source.

2. As noted above, sediment is often a contributor to biological problems and MDE has developed a tool to evaluate biologically degraded streams for sediment impacts. This will eventually become a part of the stressor identification methodology, but MDE is poised for more rapid action on this aspect of the sediment issue. If sediments are identified as a primary contributor to biological degradation, resources can be targeted to specific sites for the greatest effect.

Meeting water quality criteria for sediment pollution will involve demonstrating in nontidal waters that biological degradation was a result of excessive sediment and that biological criteria, as described above are now being met. The new clarity criteria will be applied for determination of attainment status for clarity assuming the likely situation that the tidal Corsica will be listed for clarity impairment in 2006.

The following milestones and metrics will be key to achieving our goals:

1. All listed milestones for biological degradation
2. Completion of tidal monitoring and determination of whether water clarity standards are attained.
3. Tracking annual implementation of appropriate sediment controls

4. Quantitative progress metric: tracking changes is suspended solids (non-tidal) and secchi depth (water clarity) tidal.

Bacteria

Impairment

There is currently a single tidal impairment for bacteria in the Corsica River for a shellfish area where bacterial concentrations are too high for harvest. As a result of monitoring last year, but too late to be included in the 2004 Impaired Waters List, it is likely that we will have to list areas upstream of Centreville for bacterial impairments in 2006.

Activities needed to de-list

The TMDL document for the tidal bacterial impairment is currently in review and submittal to EPA is anticipated for September 2005. It calls for a 63% reduction in bacterial loads. Attributions have not yet been made to specific sources. This is an interim TMDL based on land use and predicted bacterial loads from those uses. MDE has collected field data for *Bacterial Source Tracking* that compares patterns of antibiotic resistance of unknown bacterial isolates to those of known bacterial sources to estimate more accurately the probable relative source contributions to more accurately target management actions.

MDE's Shellfish Certification Program will continue to collect bacterial data to determine attainment status. Two criteria must be met to demonstrate attainment of the required standard: (1) median concentration of ≤ 14 MPN/100ml and (2) 90^{th} percentile ≤ 49 MPN/100 ml based on samples taken over several years.

The following milestones and metrics will be key to achieving our goals:

1. Tracking bacterial concentrations with respect to ongoing controls.
2. Completion of BST work and confirmation of source specific allocations and controls.
3. Identification of source specific implementation.
4. Quantitative metric: attainment of median and 90^{th} percentile standards.

Toxics

Impairment

The toxics impairment is based on concentrations of PCBs and Dieldrin in fish that exceed an acceptable risk level for freely eating unlimited amounts of fish from this river. PCBs, the primary risk driver is a "legacy" pollutant that no longer has any registered uses; dieldrin is also no longer registered for any uses. Sources are very diffuse and no "hot spots" have been identified in the Corsica River. Chlorinated compounds like PCBs concentrate and accumulate in the fatty tissue of fish and at higher trophic levels (top level predators) even low environmental concentrations can result in fish tissue concentrations that make fish unacceptable for unlimited consumption (> 8, 8 ounce meals per month). Dieldrin, also a chlorinated compound is present in relatively low levels that further restricts the safe consumable amount of fish but would result in minimal restrictions by itself.

Activities needed to de-list

Because of the diffuse nature and lack of effective regulatory controls or applicable management practices, it is unlikely that attainment of water quality standards can be achieved in a predictable period of time for these toxic contaminants. The recommended approach in the absence of any remediable sources is to provide adequate notice and public education so that fish consumers can adjust their behavior appropriately. The education and public notice will be implemented by MDE's fish consumption advisory program. No specific milestones are set, removal of the impairment within the next ten years is unlikely, and thus no additional funds are requested.

The following milestones and metrics will be key to achieving our goals:

1. Quantitative Progress metric: Triennial measurements of fish tissue concentration of PCBs.

What is needed to de-list

The State's overall water quality management goal for the Corsica River watershed is to classify surface waters as Category 1 (all specific uses and specific water quality criteria are met) in the State's Integrated 305(b)/303(d) Report. This task can be broken into four subcategories:

- Reduce nutrient loading in tidal Corsica River to meet TMDL nitrogen and phosphorus load limits to tidal waters so appropriate dissolved oxygen criteria for Use II - Shallow and - Open Water uses and Use II – Shallow Water criteria for water clarity in due lower algal production (measured by chlorophyll a levels).
- Address the sediment impairment in the tidal Corsica River and reduce suspended sediment levels to meet Use II - Shallow Water criteria for water clarity due to excess turbidity
- Address the bacterial impairment in the tidal Corsica River and reduce bacterial levels to meet Use II – Shellfish Harvesting criteria and minimize any human-source bacterial levels that would permit shellfish harvesting in available waters (excepting permanently-closed WWTP discharge safety zone).
- Address the toxic impairments in the non-tidal waters of the Corsica River watershed to meet Use I criteria and improve necessary water and habitat quality issues so that aquatic life communities will meet reference conditions.
- Address the biological impairments in the non-tidal waters of the Corsica River watershed to meet Use I criteria and improve necessary water and habitat quality issues so that aquatic life communities will meet reference conditions.

Existing Programs that fix pollution problems

Maryland has many programs that address water quality. Some of the significant programs, like the **Total Maximum Daily Load (TMDL) Program**, and the **National Pollutant Discharge Elimination System (NPDES) Program**, both at the Maryland Department of the Environment (MDE), are regulatory. Additional regulatory programs exist to address nonpoint source pollution such as the Nutrient Management Regulation of 1998 at the Maryland Department of Agriculture (MDA). Other voluntary programs for facilitating water quality and habitat improvements at the state and local levels include MDE's **Source Water Protection Program**, and **Watershed Restoration Action Strategy (WRAS) Program**s, the **Tributary Strategy Program** at the Maryland Department of Natural Resources (DNR). and the CREP and MACS

programs (MDA). Maryland's growth management policies also provide a framework by which preventative measures can be implemented to minimize development's impact on water quality.

Total Maximum Daily Loads

MDE manages the State's Total Maximum Daily Loads (TMDLs) Program. TMDLs are a requirement of the federal Clean Water Act, §303(d) and became law in 1972. A TMDL establishes the maximum amount of an impairing substance (pollutant) or stressor that a water body can assimilate and still meet specified water quality standards and allocates that load among pollution contributors. TMDLs are a tool for implementing state water quality standards. They are based on the relationship between pollution sources and in-stream water quality conditions. The TMDL Program uses simulation models, statistical analysis approaches, and monitoring to calculate the maximum pollutant load a water can assimilate and still meet water quality standards. Each TMDL addresses a specific pollutant, thus a water body could have multiple TMDLs. Water bodies require TMDLs when pollution controls are not stringent enough to meet applicable water quality standards. Although TMDLs may be established at geographic scales ranging from the entire Chesapeake Bay to small lakes, most of Maryland's TMDLs are often established at the same scale as the WRASs. WRASs can provide one mechanism to help address TMDLs by identifying actions that can be taken by the pollutant-loading contributor.

Stormwater Programs

Urban development has a profound influence on the quality of Maryland's waters. To start, development dramatically alters the local hydrologic cycle. The hydrology of a site changes during the initial clearing and grading that occur during construction. Trees, meadow grasses, and agricultural crops that intercept and absorb rainfall are removed and natural depressions that temporarily pond water are graded to a uniform slope. Cleared and graded sites erode, are often severely compacted, and prevent rainfall from being absorbed into the earth.

Along with the rest of the country, Maryland has developed a National Pollutant Discharge Elimination System (NPDES) Stormwater Permits Program to address the multiple water quantity and quality impacts caused by impervious surfaces. Phase I requirements (<250,000 and >100,000 jurisdictions), requires controls for stormwater discharges associated with 11 categories of industrial and for municipal separate storm sewer systems serving populations of 100,000 or greater, (10 jurisdictions and SHA). Ten jurisdictions and the State Highway Administration (SHA) currently are covered under individual municipal NPDES stormwater permits. Phase II requirements affected 60 small municipalities who are covered under a general permit that includes the required to implementation of six control measures: public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control, and pollution prevention/good housekeeping. All municipal facilities must have pollution prevention plans. They may rely on other "qualifying local programs," i.e., erosion and sediment control plans and stormwater management programs.

NPDES stormwater control plans permits require an assessment of natural resources water quality, watershed assessment and restoration targets, physical, biological and chemical analysis of stream systems, and load reduction estimates. In addition, Phase II plans call for the identification of responsible personnel for permit compliance, adequate authority certification,

discharge characterization, management programs, and fiscal analysis to comply with the permit, and Chesapeake Bay Program and Agreement participation.

Nutrient Management In Maryland

For more than a decade, the Maryland Nutrient Management Program has been helping farmers voluntarily implement nutrient management plans on their farms to protect waterways from excess crop nutrients and animal wastes. In 1998, the Maryland General Assembly passed sweeping legislation requiring all Maryland farmers grossing $2,500 or more annually or raising 8,000 pounds or more of live animal weight to file a nutrient management plan with the Maryland Department of Agriculture (MDA) by December 31, 2001 and implement the plan by December 31, 2002. The law also requires commercial lawn care companies and certain non-agricultural fertilizer applicators to follow Maryland Cooperative Extension guidelines for applying nutrients.

Responsibility for the Nutrient Management Program's (NMP) overall management and implementation rests with MDA. It oversees the certification, continuing education and nutrient applicator training programs for consultants and farmers. MDA also serves as the program's regulatory agency, maintaining six regional NMP offices throughout the state to help farmers and consultants achieve compliance with program requirements. In other areas, MDA coordinates and verifies compliance with cost-share and incentive programs incorporates new research and field testing of state-of-the art nutrient reduction strategies. MDA works closely with a number of other agencies, including the University of Maryland—the program's technical and research arm—to combine resources, conduct education and training programs and ensure consistency with Maryland's soil conservation and water quality goals.

Maryland Agricultural Cost Share (MACS)

State and federal funds are used to provide grants to Maryland farmers for the installation of best management practices (BMPs) to address existing or potential water pollution conditions associated with farming activity. Farmers may receive up to 87.5% of the cost of approximately 30 eligible BMPs.

In state fiscal year (SFY) 2004, farmers installed over 1500 BMPs using $4.8 million provided through MACS. Farmers participating in the program invested over $600,000 of their own money for these practices, which collectively will prevent 1000 tons of manure daily and 15,000 tons of soil annually from impacting Maryland waterways and improve management of an estimated 1,860 tons of animal manure daily.

MACS provided more than $1.5 million in cost share for BMPs installed on land enrolled into the Conservation Reserve Enhancement Program in 2004.
Additionally MACS funded over 196 nutrient management plans developed with the services of private sector consultants. These plans were developed with $271,549 in cost share support and affected 90,841 acres of agricultural land.

Cover Crops

Cover crops are used as a tool to prevent soil erosion and control nutrient movement following crop harvest. In 2005, Maryland will implement a new program utilizing funds from the Bay

Restoration fees. To encourage farmers to plant cover crops early to maximize nutrient uptake, USDA, NRCS will provide an additional $10 per acre for cover crops planted by October 1. Maryland had provided $30 per acre for base payment crops planted prior to October 15 and $20 for cover crops planted by the regional deadline.

MDA is in the process of contracting with the Schaefer Center fro Public Policy to explore opportunities to increase participation in the cover crop program. Statewide focus groups have been held with the farm community and a survey will be mailed to 300 farmers to get input on potential program changes to increase participation.

Soil Conservation and Water Quality (SCWQ) Program

Soil Conservation and Water Quality (SCWQ) Plans are at the heart of Maryland's resource conservation and protection efforts. Developed and implemented through a local delivery network of soil conservation districts, these plans help farmers manage natural resources and identify and solve potential environmental problems while reaching optimal but sustainable production goals. SCWQ plans contain a menu of best management practices (BMPs) to help farmers prevent sediment, nutrients and fertilizers from impacting nearby waterways.

In 2004, 1,100 soil conservation and water quality (SCWQ) plans were developed for 87,000 acres with an associated 5700 BMPs installed. Plans are considered current for a maximum of ten years. In addition to planning acreage for new cooperators, local Soil Conservation Districts (SCDs) keep a rolling tally of acreage planned in the past and have an ongoing system of regular updates. In 2004, 850 existing SCWQ plans were updated to ensure their continued effectiveness in manage 100,000 acres and protecting natural resources.

Conservation Reserve Enhancement Program (CREP)

Maryland was the first state to take advantage of the innovative Conservation Reserve Enhancement Program (CREP), which allows states to focus on natural resource issues of the greatest local concern. Under the program, Maryland landowners can protect sensitive streamside areas and highly erodible lands and restore wetlands. CREP provides annual rental payments for 10 –15 years and cost share for installing BMPS to conserve these sensitive resource areas. Since program initiation in October of 1997, Maryland landowners have protected over 71,200 acres of these sensitive lands through CREP enrollment and BMP installation.

In March 2005, Maryland's reauthorized Conservation Reserve Enhancement Program became effective. Incentive payments were modified to maximize stream buffer miles. This will refocus the program on providing maximum water quality benefits.

Tributary Strategies and Watershed Plans (Watershed Restoration Action Strategies (WRAS)

The Tributary Strategy Program (circa 1995) and the Watershed Restoration Action Strategy Program (circa 2000) are two programs that address water quality and habitat with distinctive and complementary approaches.

In general, the Tributary Strategies define the load reductions needed to meet nutrient and sediment goals for the Chesapeake Bay and then allocates the reductions to the state's ten tributary basins. For each of the ten tributary basins, a listing of best management practices is provided to guide the state in the effort to reach the allocated load. Refining this tributary basin information down to a smaller watershed scale will be essential to the future implementation of the strategies at the local level.

In general, WRASs work at a much smaller, more detailed scale than the Tributary Strategies. For example, about 13 WRAS-sized watersheds are nested within one Tributary Strategy-sized watershed. The WRASs identify site-specific actions that, if implemented, would measurably improve the water quality of a given stream. At the local level, where most management decisions are made, a Watershed Restoration Action Strategy, (WRAS) or watershed plan, offers a good way to assess specific pollution problems and natural assets, and determine the most cost effective, socially acceptable, and practical approach to correcting the problems and protecting water and habitat.

Each year the WRAS Program provided five local governments with discretionary funding, staff support, and extensive technical watershed assessment services through competitive awards. The information from DNR's technical watershed assessment services, plus local knowledge from stakeholder involvement and leadership from local government, combined to provide powerful, consensus-based strategies. The Corsica strategy, for example, identifies priorities, opportunities, concerns, and challenges as well as potential mitigation, restoration, and protection sites. The final Watershed Restoration Action Strategy (WRAS) is the plan that can then be "shopped around" to secure funding to implement projects.

It is helpful to think of a WRAS as one of the "implementation" arms for the Tributary Strategies, working on the ground and at the scale where local management decisions are made. While the Corsica's WRAS management objectives are designed for local habitat and waters, these local improvements will have collateral benefits down stream in the Chesapeake Bay.

State Growth Management Policies

The amount of impervious surface, dictated in large part by development patterns (concentrated versus dispersed) and the infrastructure needed to serve that development, prevents rainfall from being absorbed into the ground. Excess land consumption also reduces the amount of wetlands and forestlands that serve as filtration mechanisms for urban stormwater. It is important to recognize the significance of Maryland's growth management policies as an implementation tool to maintain water quality restoration efforts. Even more important is the need to recognize the significance of growth management as a preventative implementation tool to protect water quality from the impacts of future development.

To address the impacts of growth and development patterns on natural resource lands and water quality, Maryland passed its Economic Growth, Resource Protection, and Planning Act of 1992, which provides a framework for growth management policies at the state and local government levels. This framework includes visions to concentrate growth served by adequate infrastructure, preserve rural and sensitive lands, as well as other visions that promote stewardship of the environment. Subsequently, Maryland passed its Smart Growth Initiatives in 1997, which provides funding and implementation mechanisms for the Planning Act of 1992, and Governor Erhlich issued an Executive Order in 2003 for a Priority Places Strategy that directs additional

resources, regulatory help and technical expertise to areas within Priority Funding Areas on a competitive basis.

Implementation Levels Needed to Meet Water Quality Criteria

To successfully meet water quality criteria in the Corsica River for any of the impairments for which it is currently listed, this project will need to cause a major change in pollutant inputs to fresh and tidal waters in the watershed. To address the nutrient impairment, reductions to the estimated 327,064 lbs of nitrogen and 23,167 lbs of phosphorus entering the Corsica River each year will need to occur. The question of how much of a reduction must be made is the driving force behind this and any restoration project.

The most direct nutrient reduction in the Corsica will occur when the Waste Water Treatment Plant upgrade to BNR comes on line. Nitrogen and phosphorus inputs will be reduced by approximately 10,000 lbs and 1000 lbs respectively. Bacteriological inputs will be significantly reduced with the change to a spray irrigation system. But given the estimated annual loadings for nitrogen in particular, these reductions seem rather inconsequential.

The TMDL for nutrients in the Corsica depends primarily on the wastewater treatment plant upgrade for nutrient reductions because changes in the non point source load are much more difficult to achieve. Given the uncertainties in development of the load allocations for the TMDL, the TMDL has built in a small margin of safety. But the margin of safety is built into the point source allocation. Based on the TMDL, the upgrade at the Centerville wastewater treatment plant will meet the load allocations for nitrogen and phosphorus, no reductions in the non point source load need to occur.

The exact magnitude and sources of the nutrient and sediment loads and bacteria entering Corsica River are unknown and the impact of these pollutants on the chemistry and biology of a complex natural body of water are also somewhat uncertain. Given this degree of uncertainty no definitive estimate of the needed load reduction will be made until the magnitude and sources of the pollutant loads are better defined.

As a margin of safety this project needs to ensure that significant levels of implementation continue to occur in both the urban and agricultural areas of the Corsica. Studies have shown that nutrient loads and concentrations have been reduced in other watersheds in the country by treating 60% or more of the landscape or reducing the nutrient inputs to the landscape by 50% or better (Maas et al. 1988, McCoy et al. 2003, Johengen et al. 1989, Wolf 1995). The foundation for potential implementation has already been laid by the WRAS. The Corsica WRAS has 12 components that this project needs to ensure are implemented. A subset of these components is listed below with some general background and an estimate of the level of implementation needed. A stream restoration component has been added to address the biological impairment.

Cover Crops

Cover crops are small grains planted in September or early October on land otherwise fallow with no fertilizer applied. They are one the most cost-efficient Agricultural BMPs available to reduce nutrients. Cover crops are estimated to tie up 59% of the nitrogen and 44% of the phosphorus left in soils after the main cash crop has been harvested.

In the Corsica watershed most of the agronomic crops are grown using inorganic fertilizer. Attempting to reduce nutrient inputs to cropland in the Corsica watershed by 50% by reducing fertilizer inputs has the potential to cause yield reductions and is not a viable alternative.

Treating 60% or more of the landscape with various BMPs is a more viable ~~option~~ goal. Implementing agricultural BMPs that cause significant nutrient reductions on 60% of the cropland in the Corsica watershed has the potential to have a dramatic impact on water quality at some point
.
There are approximately 15,000 acres of cropland in the Corsica. Annually 7000 acres are in corn, 5000 acres of wheat and 8000 acres of soybeans. During the fall and winter there are approximately 5000 acres of wheat and 10,000 acres is fallow, ~~which could~~ of which a portion could be in cover crops. This project needs 4,000 acres of cover crops and 2000 acres in a small grain enhancement program annually to create a significant impact on water quality in the Corsica River. Estimates of the nitrogen and phosphorus reductions from this practice with 6,000 acres under management are 42,000 lbs. and 1140 lbs. respectively.

Buffers, Forest Cover and Conservation Landscaping

Nutrient and Sediment Reducing Buffers are important permanent measures for water quality and habitat enhancement in the watershed. To best actualize the benefits of these buffers, they should be at least 100 feet wide - 50 feet on either side of an intermittent stream and a full 100 feet wide on each side of a perennial or blueline stream and the same for Critical Area's standard shore buffer. The Buffer Gap analysis from the WRAS SCA was used to identify and prioritize areas in need of increased buffer plantings and conservation landscaping. The total linear frontage of buffer gaps in the Corsica watershed is estimated at 4.5 miles and an additional 4.7 miles of shoreline.

Reforestation outside of riparian buffers also provides many ecological benefits, not the least of which is improved water quality in receiving streams. Large lot developments in rapidly developing areas like the Corsica watershed promote the conversion of cropland into lawns.

The goal of this initiative is to add 100 acres of forest/grass stream buffers in agricultural areas (Centerville 2004), convert 200 acres of lawns into forests and buffers in residential areas and cover 90% of the shoreline buffer gaps with conservation landscaping to a depth of at least 100 ft from mean high tide in residential areas. An estimate of the nutrient reduction efficiency of CREP on the Upper Eastern Shore is 43% for nitrogen and 53% for phosphorous. Therefore, assuming low till for a more conservative agricultural practice on the average, conversion from arable to buffered lands should yield a reduction of 300 ac. X 21.3685 lbs/ac x 0.43= 2,757 lbs of nitrogen per year and 300 ac. X 1.4951 lbs/ac. X 0.53 = 238 lbs of phosphorus per year. The per acre reduction will be somewhat less on parcels where the conversion is from suburban lawn to buffer or forest.

Horse pasture management

Horse Pasture Management for smallholdings are a significant concern in the Corsica. This is an area that can fall through the regulatory cracks and not be addressed by standard agricultural conservation programs. Smallholdings with livestock are easily overstocked and manure management neglected. This can lead to expensive health issues with livestock and cause localized water quality and habitat degradation. Implementing cost effective techniques for manure storage and treatment as well as entrapment and treatment of surface run-off on a goal of 50 acres in the Corsica could lead to significant nutrient reductions. The estimated reduction is as follows: 50 acres x 2282.4784 lbs/ac. x 0.14 = 15,977 lbs of nitrogen and 50 acres x 277.7539 lbs/ac. x 0.14 = 1,944.28 lbs.

Homeowner Pollution Reduction

Household Pollution Reduction strategy involves the Town of Centreville sponsorship of an outreach program to promulgate Urban Nutrient Management pieces on lawn fertilization and pet waste control. The program would involve outreach to homeowners regarding nutrient applications to lawns and Town Ordinances, which would regulate commercial lawn care. The goal is to impact 400 acres within the Town.

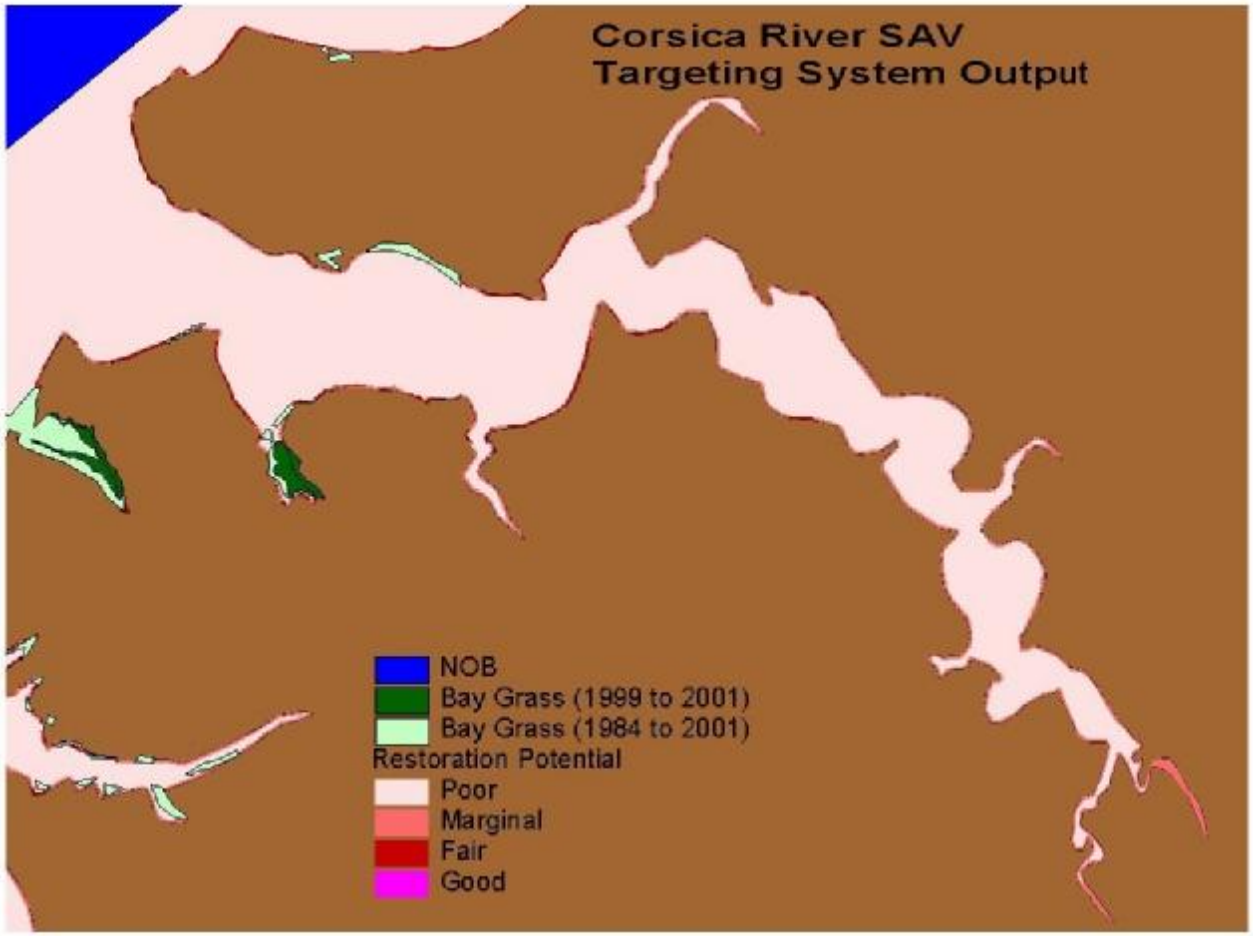
The estimated nutrient reduction for the homeowner outreach is a follows: 400 acres x 9.3315 lbs/ac x 0.17 = 634.54 lbs. for nitrogen and 400 acres x 1.3399 lbs/ac. x 0.22 = 117.91 lbs.

SAV

Submerged Aquatic Vegetation (SAV) Reestablishment is an important component of this project. The presence and sustainability of SAV beds in the Corsica River constitute an ongoing measure of water clarity, and chemical quality. While SAVs may be the canary in the coal mine, its survival will give a very visible and measurable means to gauge watershed improvement. This is also an area where a growing corps of volunteers and students are interested in becoming vested in the restoration process.

Current SAV Status

Currently, the Corsica River has very sparse SAV coverage only visible by ground surveys. The existing SAV beds are primarily composed of widgeon grass, a species known for great inter-annual variability. If water clarity was improved in the Corsica River as a result of nutrient reduction (WWTP upgrade), a large natural expansion of widgeon grass (***Ruppia maritima***) is possible without directed SAV restoration activities. There is no SAV goal specifically for the Corsica River but an SAV goal for the entire meso-haline portion of the Chester River (2724 acres) encompassing the Corsica River.



Current SAV Activities

The species and restoration techniques chosen will depend largely upon the results of the Anne Arundel Community College (AACC) large-scale propagation study (to be completed in 2005). Specific sites will be selected by two years of rigorous habitat monitoring and test plantings. In 2004, MD-DNR began evaluating SAV restoration potential at several sites in the Corsica River. Small (~2m^2) plots of sago pondweed (*Stuckenia pectinatus*) , redhead grass (*Potamogeton perfoliatus*) and wild celery (*Vallisneria americana*) were planted at three sites in the upper reaches of the river in June, 2004. Plants survived at each site through October 2004, with sago pondweed and redhead grass surviving best downriver, and wild celery doing well upriver. If a suitable site is currently vegetated by one species, opportunities may exist to increase species diversity or re-introduce indigenous species.

Total water surface area (acres)	**Potential SAV habitat (acres) (SAV Targeting, (MD-DNR)**	**Total area vegetated (2001-2003) (acres)**	**Recent SAV species present**	**Possible SAV restoration species**
1333	127	0	Widgeon Grass, Common waterweed	Redhead Grass, Sago Pondweed, Wild Celery

Low Impact Development

Low Impact Development Technique in Ordinance Form
Water Quality Protection Regulation

The Town of Centreville is developing the Centreville Water Quality Protection Regulation and associated Centreville Water Quality Design Manual. This ordinance and manual will supercede the existing Queen Anne's County Storm water Management Ordinance currently regulating such activities within the Town. This new regulation and design manual is being modeled after the Huntersville, NC low impact development The Prince George's County Maryland Low Impact Development Design Strategies and the MDE Model Storm water Management Ordinance (2000) must be used to ensure that volumetric or quantity management objectives of the State of Maryland are integrated into the final Town code. Because the vast majority of the impervious area in the watershed is found within the Town and its growth area, LIDs will make a significant contribution to development and urban-driven nutrient and sediment reductions.

The first step in the implementation process after the adoption of the above anticipated code will be the design and construction of regional urban storm water management facilities on publicly owned lands along the Millstream and along Gravel Run. These facilities are in addition to the marsh creation opportunities that exist at each of these sites. At the very least, mechanical trash removal and water quality improvements will be implemented. The goal reduction is 33% for nitrogen and 46% for phosphorous improvement over existing untreated lands. A calculation for Centreville is as follows: 996 acres (urban impervious) x 8.1184bls/ac. x 0.33 = 2668.36lbs of nitrogen and 996 acres x 0.5145 lbs/ac. x 0.46 = 235.72 lbs. of phosphorous.

Easements

An Easements Incentive Program for acquisition of development rights within the watershed is contemplated which would boost the rate of conservancy in the Corsica River Watershed. This program will be coupled with a Town of Centreville Comprehensive Land Use Plan that establishes an Urban Growth Boundary around the Town and a platted Greenbelt within the Town limits into which priority funding would be funneled by the Town for easement acquisition.

Non Agricultural Wetlands

Creation of Non-Agricultural Wetlands is deemed a valuable means of effecting human behavior changes resulting in stronger watershed stewardship. The restoration of upper headwater (prior converted wetlands) can play an important role in sequestering nutrients and sediments. Most of the opportunities for wetland restoration are on agricultural lands and farmland converted to low density development. The cost of conversion of agricultural land to wetland is a loss to the farmer in terms of the economic value of the land. Agricultural programs that promote best management practices (BMPs) can offset the cost of converting drained hydric soils back to wetland through rental agreements. In the urban environment, these wetland restoration opportunities are down stream in the watershed and at or near the tidal interface with the Corsica River. These areas include both tidal and nontidal systems where public land inside

the Centreville municipal limits is adjacent to the fresh water tributaries and the main stem of the Corsica River.

Septic System Retrofits

As a large portion of the non-agricultural nonpoint source nutrient load, septic system retrofits are believed to be a critical priority in the Corsica River watershed. There are existing systems that are installed in marginal soils, some are very poorly (if ever) maintained, some lie within 300 feet of a tributary stream or the edge of tidal water, and employ dated technology not capable of any significant nutrient reduction. Many innovative systems are now commercially available some of which are currently pre-qualified for installation in Queen Anne's County by the Queen Anne's County Environmental Health Department. The overall goal of is to reduce nutrients from septics throughout the watershed, particularly those within the 300 foot critical area. Conventional systems that are permitted in the County emit 40 - 60 mg/l of nitrogen (estimated N content in what flows from the whole septic system into the groundwater). The goal is to reduce this to about 20-25 mg/l on 30 systems. [For the purposes of this initiative, 80-100 gallons per day per capita is used to determine total annual flow. This will reduce nitrogen inputs to the Corsica by an estimated 365 lbs per year.

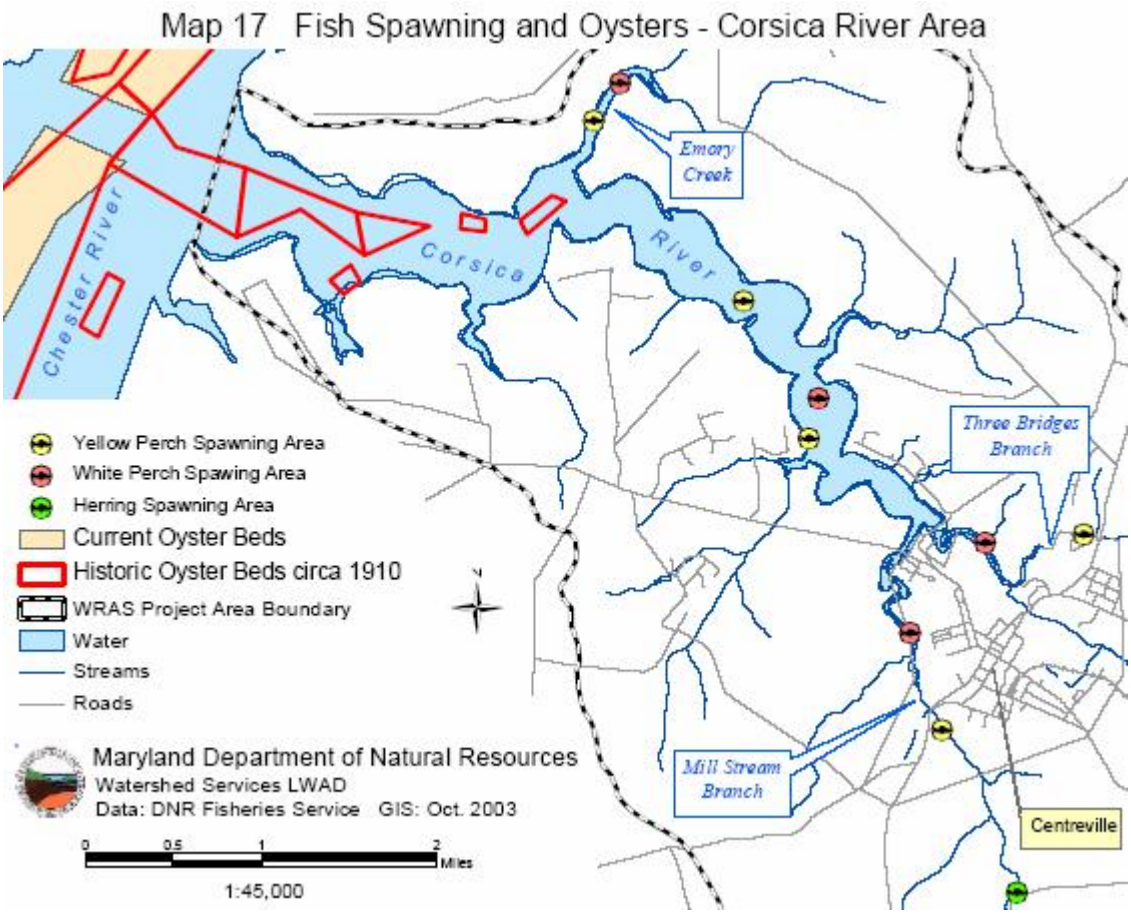
EcoTeams

EcoTeams offer an opportunity within the watershed, and beyond, to coalesce a growing environmentally concerned citizenry into function teams to plan and implement workshops, school education programs and to measure and track homeowner behavioral changes over time.

The teams in conjunction with the existing watershed association will provide the energy and motivation to make the project sustainable over the long run.

Oyster Restoration

Oysters have the potential to serve an integral function in reducing turbidity and maintaining clarity in the Corsica River, if the populations are very abundant. The restoration of historic shellfish areas, shown on Map 17, should be formally set aside in Sanctuary, seeded, and monitored as to viability. The goal of the restoration project is to reestablish 20 acres of oyster beds in the Corsica. A “sentinel” project could be initiated to determine suitability of the river for long-term oyster population development prior to initiating a large scale effort. A sentinel project would be on the scale of one or two acres.



Stream Restoration

Habitat degradation in the tributaries to the Corsica River has caused two of the sub-watersheds to be listed as biologically impaired. The Stream Corridor Assessment identified erosion problems at 57 sites representing approximately 12.2 miles of stream, inadequately buffered stream or river banks at 34 sites, representing approximately 4 miles of stream and channel alterations at 20 sites representing 1.17 miles.

Restoration of the reaches designated as impaired will be necessary to meet biological criteria. The three 75 m reaches originally sampled will be targeted for restoration. Stream restoration activities beyond these sites will be targeted to areas undergoing development and road construction. The goal is to restore 2 miles of stream reach or slightly more than 10 % of the stream miles in the watershed.

Programmatic Changes That Protect Water and Habitat into the Future

Building-in insurance for future water quality and habitat protection can be accomplished at the local government level through "programmatic changes". Watershed plans that results in easements, zoning, codes, or regulation changes are programmatic change mechanism but, a watershed plan, or plan component, that becomes included in Comp Plan is another approach. For example, a new overlay district (forest conservation or protection areas or variable stream buffer areas – perhaps targeted to specific species protection), included in a Comprehensive Plan would require the overlay districts to be reviewed before any major decisions about the

landscape's development are made. Defining a growth boundary/area in the Comp Plan can also direct growth, conserve open space, and protect resources.

In addition, policies that determine development receiving and sending areas (transfer of development rights) may be helpful, as would the prioritizing or targeting of lands for protection in a land preservation program. Additionally, the revision of subdivision regulations to allow for flexible development/design standards, such as LID or infill development can protect the future of water quality and habitat by reducing the cumulative impacts of traditional storm water management.

Other approaches exist such as developing policies that require a review of public works activities relative to stream impact or habitat impact; requiring pedestrian audits before development or road building to encourage pedestrian traffic; or, offering bonus incentives for restoration or protection activities during development.

In the Corsica River WRAS, completed by the stakeholders in 2004, several major programmatic changes were recommended. The impetus behind the "program change", other than it being a required deliverable of the supporting WRAS development grant, was to insure that water quality and habitat protection would be "built-in" to future local government initiatives, policies, and programs.

Program changes were recommended for the Town of Centreville, Queen Anne's County, the Eastern Shore Land Conservancy, and the Chester River Association. This review focuses primarily on the Town of Centreville.

For the Town of Centreville, 14 program changes were proposed including:

- A low impact development ordinance
- An easements incentive program
- Ordinances to establish sewer allocation management plans
- Resolutions to establish oversight and redundancy in monitoring of sewerage
- Water and storm drain infrastructure
- The development of a Comprehensive Plan in cooperation with queen Anne's County that integrates the ethic and strategies of the WRAS throughout
- Ordinance for storm water management and water quality manual using LID techniques to the fullest
- Proclamation to establish the Centreville Wharf as a "Green Marina"
- Ordinance for sediment and erosion control inspection, and enforcement
- Ordinance for Urban Nutrient Management Plans
- CIP addition to include design and construction of regional storm water management facilities on Town owned lands at the Millstream and Gravel Run
- Ordinance to establish an Urban Growth Boundary, the limits of which must be consistent with MDL for a calculated maximum future conversion of agricultural land
- Formal resolution to proceed with Wastewater Treatment Plant expansion to match Comprehensive Plan vision and to include Enhanced Nutrient Removal technology (Formal resolution was adopted 8.12.04 authorizing the Town Manager to proceed with the search and negotiations for added spray field capacity)
- Ordinance setting the limits for phosphorous in commercial cleansers and TSP use within the Town

- Memorandum of Agreement to support the Implementation of the WRAS recommendations
- Promulgate Living Shorelines outreach piece and UNR tri-fold outreach pieces to all citizens and future building permit certificate of occupancy recipients.

Lastly, and most developed conceptually, was an ordinance establishing a "Greenbelt" together with a per unit assessment through the building permit process, of impact fee for preservation, targeted only to the greenbelt area was proposed. Specifically, this program change is an easement incentive and strategic land conservation program that would curtail sprawl development and protect water quality, agricultural lands and their economic viability, and the vitality and definition of the watershed's main growth center, Centreville.

This program would serve to provide a defined edge between town and rural lands of the watershed through a greenbelt. Specifically, the Town of Centreville would establish an urban growth boundary (UGB), and a platted greenbelt within the Town limits. Existing and new priority funding to purchase the development rights and development in the UGB would pay for the greenbelt easement acquisition.

UGB could identify the extent to which Centreville envisions growing. The greenbelt then could serve to secure this perimeter by providing a buffer of lands protected from development (range from existing low density residential, to open space, to resource conservation, to agricultural land uses).

In addition to the Town's establishing the Centreville Greenbelt and making it a priority for funding, this Conservation Program would include the development of an implementation toolbox, containing existing and new financing options and incentives, focused on providing protection of greenbelts lands. These options could range from agricultural land/open space fees adopted through an annexation program, fostering Town public sources of acquisition funding, Town easement tax incentives, and others as determined appropriate.

First steps in moving towards a strategic land conservation program include the Town of Centreville evaluating annual land protection priorities, budgets, and partnerships needed. The Town of Centreville, in coordination with Queen Anne's County would jointly adopt an updated Town of Centreville comprehensive land use plan and the Town of Centreville would establish a definitive, platted greenbelt area within the Town Limits. Zoning in Town should then complement the intent of the greenbelt with such policies as restrictive residential zoning, agricultural/rural zoning, design guidelines for scenic protection for new development, and if applicable, designation of greenbelt area as a sending area for any related transfer of development rights program with the Town acting as the receiving area. The Town would also have to establish a policy of making the greenbelt lands a priority for conservation funding. Financing options and incentives focused on providing protection of greenbelts lands would also need to be developed.

The implementation of all of these components has the potential to reduce nutrient inputs to the Corsica River by approximately 25%. Significant sediment and bacteriological reductions are also anticipated but given the variability in the effectiveness of practices from site to site and the variability of estimates of reductions due to restoration activities, and estimate of reductions seems inappropriate.

Agriculture Current Implementation Levels

Agricultural operations in the watershed have and continue to employ a variety of practices through Federal, State and private cost-share programs. Farmers in the Corsica River watershed continue to adopt practices such as; diversions, filter strips, grade stabilization structures, grassed waterways, conservation cover, roof runoff and riparian forest buffers. These practices annually increase the baseline level of nutrient removal and water quality protection. This baseline provides an estimated average of 2,450 lbs/yr nitrogen and 240 lbs/yr phosphorus reduction. Nutrient management and Soil Conservation and Water Quality Plans provide additional reductions that could range from 22,000 to 61,000 lbs of nitrogen and 3,000 to 6,000 lbs of phosphorus per year.

BMPs since 1/01/2000	**Extent**	**Unit**
Conservation Cover	16.6	Ac
Diversion	250	Ac
Riparian Herbaceous cover	54.8	Ac
Riparian Forest Cover	12.5	Ac
Filter Strip	163.7	Ac
Grade Stabilization Structure	10	St
Grass Waterway	0.6	Ac
Lined Waterway	50	Ac
Nutrient Management	11454	Ac
SCWQPI	12217.6	Ac

Feasibility analysis

Agricultural land

The watershed is not heavily animal agriculture, largest animal number are small horse operations. The agricultural base is cash grain with some vegetable operations. Good implementation of both agronomic and structural conservation practices is present in the watershed. Soil Conservation District stated that the options for implementation are limited to additional buffers, nutrient management, cover crops and addressing non-traditional agriculture; i.e. horse owners.

Planning for Future Growth

How growth is managed and planned for within this watershed could prevent additional contributions of identified pollutants, and provide a significant preventative tool for maintaining the de-listing of the Corsica River.

Development capacity, household projections and alternative growth scenarios can provide a basis by which the impacts of growth on water quality can be assessed in the Corsica River watershed. In order for MDP to conduct such assessments, it must work with Queen Anne's County and the Town of Centreville to obtain the most recent GIS layers, base data and zoning

yields. MDP is currently working with Queen Anne's County but must start working with the Town of Centreville for data and yield updates.

For the purposes of the business plan, MDP provides an assessment of Queen Anne's development capacity for 25-year household projections and the capacity by which its PFAs can accommodate this growth. This provides the type of information that MDP can generate for at the watershed level, in addition to but not limited to the analyses referenced above.

For example, MDP projects that between 2000-2025 the County can expect an increase of 8,135 households. Approximately 75% of the total countywide 25-year household projection can be accommodated inside the County's Priority Funding Area (PFA). This means that current zoning will not accommodate 25-year growth projections inside PFAs. How does this assessment play out on the watershed level? How much of the County's growth is projected in the watershed? Can the watershed's PFA accommodate 25-year household projections inside its PFAs? Do current programs, policies and regulations direct most of the growth inside PFAs at the watershed level? At what point will discharges from the Centreville wastewater treatment plant trigger nutrient caps and how much growth can be accommodated given the caps? These are the types of questions that should be explored if this project is to have a sustainable impact.

Potential for Success and Time Frame

The potential for this project to successfully meet water quality criteria in the Corsica River is good if adequate resources are provided and the goals for implementation are met. The time frame for success depends on the impairment and the levels of implementation achieved. The nutrient impairment

Barriers & Solutions

Buffers:

Since the advent of the Conservation Reserve Enhancement Program (CREP) over 5,624 acres of buffers have been installed in Queen Anne's County. The Program has just been reauthorized and the local SCD is accepting applications. One of the goals of improvement of water quality in the Corsica watershed is to continue to expand the riparian coverage. The issues to significantly increasing the general coverage of buffers in the watershed, have been identified by the local SCD personnel as; a) many of the operations in the watershed utilize lease lands and the absentee landowners are unaware of the CREP program or rely on the local farm operator to manage the acreage; b) the program emphasis on a riparian option which is just unpractical in a crop field setting; c) prior emphasis on additional acreage has provided a habitat and wildlife benefit which conflicts with productivity; d) buffer assessments focus on a 50' – 100' buffer as necessary but due to low slope conditions most farmers see a 35' buffers as adequate protection.

The solutions to these concerns may have been addressed under the new CREP program with its emphasis on higher incentives for the first 100'of grass or forest buffers and the introduction of a new practice with a more mixed vegetation planting. The remaining issue is the lack of staff to work with the farmer in education, outreach, and eligibility, design and construction certification.

Nutrient Management

The overall statewide goal for nutrient management is to develop a program that benefits the farmer and the environment. Maryland's regulatory program is still evolving and farmers need to comply with the programs requirements. A key focus of the program, in this watershed, must be in the identification and outreach to the growing equine industry. The majority of these non-traditional agricultural operations, are unaware that they meet the minimum threshold and are required to comply with the Water Quality Improvement Act of 1998.

Cover Crops

Cover crop sign-up and participation are controlled by two factors; a) funding availability; b) program complexity. General coverage of cover crops in the watershed remains spotty. Although in a good year between cost-share cover crops and small grains grown for harvest up to 40% of the available acreage may receive treatment. The state cost-share program sign-up in the Corsica has varied from a high of 2,330 acres in "03" to a low of 400 acres in "04". The cover crop program is currently undergoing some dramatic changes to make it more farmer friendly and easier to manage. A series of local meetings have been held statewide with the farm community to understand what are the problems with the current program. The Schaffer Center for Public Policy has been contracted to conduct a poll of the farm operations to help and design a more manageable program for FY "05". One of the suggestions that would be a option to pursue in the Corsica watershed was a demonstration of a custom seed drill applicator available to the farmers upon sign-up that would do the application on their land once the crops have been harvested.

Horse Pasture Management

The largest expanding domestic animal population in the Corsica watershed is the equine segment. Horses are a non-traditional agricultural operation that typically falls outside of the agriculture or urban oversight. A typical operation consists of two to four horses with insufficient land for this size operation and a lack of knowledge manage the environmental consequences. In some western shore counties the SCD have hired an equine specialist (AA Co. and Montgomery Co.) to work specifically with horse owners on water quality problems. There continues to be a lack of fiscal resources to provide incentives to implement the pasture and manure management BMPs that are needed. These are generally low-tech practical solution that can make a significant difference.

Institutionalizing the need to address water quality issues in planning and budgeting

Maryland's growth management policies include visions to address Chesapeake Bay water quality goals and a requirement for local jurisdictions to incorporate a sensitive areas element into comprehensive plans. Since the passage of the 1992 Planning Act and the 1997 Priority Funding Areas Act and Rural Legacy Program, additional water quality goals and requirements such as TMDLs, and the nutrient limits of the ENR Strategy, 30% reduction in the rate of sprawl by 2010, and other urban nonpoint source goals of the Tributary Strategy have been established. The need exists to institutionalize these goals and requirements in comprehensive plans.

Additionally, the sensitive areas element in comprehensive plans leaves room for varying degrees of interpretation by local jurisdictions; therefore, goals for protecting sensitive areas vary from jurisdiction to jurisdiction. Furthermore, many rural jurisdictions lack the professional expertise to incorporate water quality issues into local planning efforts.

A solution to this barrier is for Maryland's state agencies to work together to expand and build upon the current growth management framework to provide local jurisdictions with guidance to integrate TMDL requirements, Tributary Strategy goals and more protective sensitive areas policies and programs (in the appropriate jurisdictions) into comprehensive plans. The next step is to require local jurisdictions to incorporate these water quality issues into local comprehensive plans. Note, local water and sewer plans must be consistent with local comprehensive plans; therefore, relevant water quality issues must be accounted for in the county water and sewer plans as well.

Additionally, local jurisdictions often lack the staff capacity to increase levels of efforts needed to institutionalize water quality issues into local planning efforts. Additional funding is needed. A solution to this barrier is for Maryland to support the creation of Chesapeake Bay Financing Authority and secure funds to provide matching funding sources as well as grants to local jurisdictions for increased staffing capacity, on-the-ground projects and the establishment policies such as storm water utilities.

Lastly, a disconnect often exists between local planning departments, environmental departments and public works departments. There is a need for these local departments to better coordinate efforts and integrate their planning and budgeting efforts together so that water quality issues can be successfully institutionalized into land use planning and facility planning. A solution to this barrier is for the State to broaden its growth management framework to provide local jurisdictions with guidance on incorporating water quality issues into land use planning, facility planning and the budgeting processes. The next step would be for the State to require incorporation of water quality issues into local comprehensive plans and facility planning and budgeting.

The Implementation Team

The majority of the implementation for this project is going to be conducted at the local level. Because the plan has not been accepted, local participation in the development of the plan has been limited to the use of the WRAS as a foundation for the implementation needs. The Implementation Team needs to include the local groups and agencies from Centerville and Queen Anne's County. Once this project is introduced at the local level the implementation team can be assembled.

Financial Plan

Cost to address Corsica impairments

Overall Ag Strategy

a) New full-time SCD staff work load to consist of:
   1. Market and implement CREP program.
   2. Cover crop marketing and signup.
   3. Work with horse owners in watershed.

   $60,000.00/ year

   5 Years $300,000

Cover Crops

New funding for demonstration project to provide custom application of cover crops in watershed

1. 4000 acres * $30 = $120,000/year.
2. 5 years = $600,000
3. 2000 acres of small grain enhancement
   2000 acres*$20 = $40,000/year
4. 5 years = $200,000

Buffers(Forest/Grass), Forest Cover and Conservation Landscaping

The goal of this initiative is to add 400 acres in the Corsica River Watershed @ $170/acre for 15 years (sign-up).

100 acres ag buffers $170/acre * 15 years = $255,000
Buffer establishment = $220,000
200 acres residential buffers and reforestation = $220,000
$950,000

Horse pasture management

Cost-share funds to provide implementation of BMPs for small horse operations $70,000.00 /year.

5 years $350,000

Urban Strategy

Homeowner Pollution Reduction – education $60,000/year
5 years $300,000

Low Impact Development-ordinance $37,000

Septic System Retrofits

30 systems * ($5,500/system installation + $1000 ($200/year for 5 years maintenance) = $195,000

Non Agricultural Wetlands

25 acre @ $20,000/ acre $500,000

SAV Restoration Implementation Costs

Goal: Seed/plant up to 10 acres of SAV beds.

Cost to seed/plant SAV:
10 acres @$16,000 acre = $160,000

Oyster Restoration

20 Acres * $45,000 = $900,000

Stream Restoration

$250/foot 2miles = $2,000,000

Implementation Funding Gap Analysis

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	
AG NPS Implementation						
SCD staff	$60,000	$60,000	$60,000	$60,000	$60,000	$300,000
Maryland Agricultural Cost Share Program	$14,900	$14,900	$14,900	$14,900	$14,900	$74,500
Cover Crops 4000 Acres @ $30/acre	$120,000	$120,000	$120,000	$120,000	$120,000	$600,000
Small Grain Enhancement 200 acres @ $20/acre	$40,000	$40,000	$40,000	$40,000	$40,000	$200,000
Buffers, Forest Cover and Conservation Landscaping $170/acre * 15 years	$255,000					$255,000
Buffer establishment	$22,000	$22,000	$22,000	$22,000	$22,000	$110,000
Cost-share funds to provide implementation of BMP's for small horse operations	$70,000	$70,000	$70,000	$70,000	$70,000	$350,000
Sub-Total Costs	$581,900	$326,900	$326,900	$326,900	$326,900	$1,889,500

Sub-Total Funding Available	$291,900	$36,900	$36,900	$36,900	$36,900	$439,500
Sub-Total Funding Needed	$290,000	$290,000	$290,000	$290,000	$290,000	$1,450,000
Urban Implementation						
WWTP Upgrade to ENR		$1,110,000				1110000
Stormwater Management	$250,000	$250,000	$250,000	$250,000	$250,000	$1,250,000
Homeowner Pollution Reduction	$60,000	$60,000	$60,000	$60,000	$60,000	$300,000
Septic System Retrofits 30 systems * ($5,500/system installation + $1000 ($200/year for 5 years maintenance)	$65,000	$65,000	$65,000			$195,000
200 acres residential buffers and reforestation	$44,000	$44,000	$44,000	$44,000	$44,000	$220,000
Non Agricultural Wetlands 50 acre @ $20,000/ acre	$1,000,000					$1,000,000
SAV Restoration 10 acres @$16,000 acre	$16,000	$16,000	$32,000	$48,000	$48,000	$160,000
Oyster Restoration 20 Acres * $45,000	$90,000		$810,000			$900,000
Stream Restoration $250/foot 2miles		$2,000,000				$2,000,000
Sub-Total Costs	$1,525,000	$3,545,000	$1,261,000	$402,000	$402,000	$7,135,000
Sub-Total Funding Available	$315,000	$1,110,000				$1,425,000
Sub-Total Funding Needed	$1,210,000	$2,435,000	$1,261,000	$402,000	$402,000	$5,710,000
Total Costs	$2,106,900	$3,871,900	$1,587,900	$728,900	$728,900	$9,024,500
Total Funding Available	$606,900	$1,146,900	$36,900	$36,900	$36,900	$1,864,500
Total Funding Needed	$1,500,000	$2,725,000	$1,551,000	$692,000	$692,000	$7,160,000

Funding sources

For this project to be successful new funds need to be secured. A reallocation of funds from existing programs with statewide mandates only weakens the overall Bay Restoration effort. Annually renewed Federal funds can be pursued for some of the implementation and evaluation activities, but sustainable fund sources need to be obtained or developed for activities that are long term commitments such as staff support annually renewed incentive payments and evaluation activities. A list of potential existing fund sources is presented in Appendix C. EPA's Chesapeake Bay Targeted Watershed Pilot Program is a new source of Federal funding directed specifically at the Bay that seems to fit well with this project. Given support at the State level this funding source should be targeted. Federal funds through the State Highway administration for wetland mitigation and stream restoration are another potential source.

State funding generated from the Chesapeake Bay Recovery Act is already factored into the funding gap analysis.

Project Evaluation

Corsica River Monitoring Plan for Oysters

The following is an estimate of the monitoring effort that would take place in the Corsica River if oyster projects were implemented. Other bivalves are not included in the restoration plan or the monitoring plan since the Shellfish Program has no methods to enhance mussel or clam populations, but it is recognized that they can also filter algae and sediment from the water. Oysters are the focus for Bay shellfish.

Oyster Monitoring

Basic Parameters:

To evaluate the progress of an oyster project and determine the status of the oyster population the basic parameters to measure are: mortality, growth, disease infection, spat set (the production of young, new oysters) and the number of oysters by size class. In addition, DNR measures water quality (temperature and salinity), depth, bottom type (shells, sand, etc), the percent buried shell to indicate if the shelly oyster habitat is becoming heavily silted, and the presence of fouling organisms that settle upon the oyster habitat.

Mortality data indicate how well the population is surviving. If 1 million seed oysters are planted, for example, it is important to know how many survive each year. Counting and measuring the oysters by size class indicates growth and population structure. Slow growth or no growth may occur if the oysters are subjected to extended low salinity. Establishing the size frequency of oysters indicates if the population is mostly small oysters or larger brood oysters for example and helps when estimating the amount of water they filter (filtration is related to size). Disease samples are analyzed to determine if the oysters are infected and how badly they are infected. Oyster diseases slow growth and kill oysters. Disease data will indicate if a problem is arising and if mortality can be expected in the future. Many oyster projects have been negatively impacted by disease. Fortunately the low salinity of the Corsica River should reduce the risk of disease. Spat set is a measure of oyster reproduction and helps determine if the site is sustaining itself through natural reproduction. The Corsica River is a location where virtually no spat set is expected due to the low salinity and oyster populations will be enhanced by planting seed from a

hatchery. Water quality measurements for salinity indicate if the environment is suitable for oyster survival, growth and reproduction. Salinity data can help explain a die-off or a rapid growth spurt, etc. (oysters die when salinity is very low and they grow well when it is higher). The bottom type and buried shell data indicate the quality of the oyster habitat and if it is degrading over time.

Sampling Times

Minimally, sites are sampled once a year in the Fall, which is when spat are large enough to easily count and when disease mortality has had its effect, but data from other times helps complete the picture of the population status.

Samples will be taken in the Fall (October) and the Spring (May). Spring samples are helpful because they can detect mortality due to Spring freshets. Samples in the Fall will be collected with an oyster dredge. Samples in the Spring will be collected with patent tongs, which take a discrete square meter sample. This allows us to estimate the oyster population per square meter and hence upon the bar. The population number combined with the size class data will provide estimations of biomass, filtration rates, nutrient removal rates and other aspects.

Three days per sampling event will be needed: one to bring the boat up, one to sample and one to take the boat back. This yields six boat days per year. However, the boat is already in the Chester River in the Fall so these three days will not be included in the cost of this project. We will add the Corsica to our routine Fall Survey. Staff time in the budget below is to prepare the Annual Reports.

Budget -- Corsica River Oyster Survey

Category	Item	Cost	
Field work	Three boat days @ $500 per day (3 days Spring) – see footnote*	$ 1,500	
Staff	Annual Report: data entry, data analysis, tables, maps, graphs. Three staff, about two weeks	$ 4,500	– rough estimate
Sub Total		$ 6,000	
	Total	$30,000	5 years of monitoring

* The 3 days in the Fall are not included in the budget since they are covered by a survey already underway. If they were included, then the Field Work cost would be $3,000 and the total five year cost would be $37,500.

SAV Monitoring Plans

Current SAV Activities

The species and restoration techniques chosen will depend largely upon the results of the Anne Arundel Community College (AACC) large-scale propagation study (to be completed in 2005). Specific sites will be selected by two years of rigorous habitat monitoring and test plantings. In 2004, MD-DNR began evaluating SAV restoration potential at several sites in the Corsica River. Small (~2m^2) plots of sago pondweed (*Stuckenia pectinatus*) , redhead grass (*Potamogeton perfoliatus*) and wild celery (*Vallisneria americana*) were planted at three sites in the upper reaches of the river in June, 2004. Plants survived at each site through October 2004, with sago pondweed and redhead grass surviving best downriver, and wild celery doing well upriver. If a suitable site is currently vegetated by one species, opportunities may exist to increase species diversity or re-introduce indigenous species.

Cost to monitor SAV:
Aerial Survey - $3,000/year, for 5 years = $15,000
Ground surveys - $1,000/year, for 5 years = $ 5,000

- Possible Sources of Funding: $3,000/year for 5 years from ongoing Chesapeake Bay annual aerial SAV survey.

Water Quality Assessment

The State's overall water quality management goal for the Corsica River watershed is to classify surface waters as Category 1 (all specific uses and specific water quality criteria are met) in the State's Integrated 305(b)/303(d) Report. This task can be broken into four subcategories:

- Reduce nutrient loading in tidal Corsica River to meet TMDL nitrogen and phosphorus load limits to tidal waters so appropriate dissolved oxygen criteria for Use II - Shallow and - Open Water uses and Use II – Shallow Water criteria for water clarity in due lower algal production (measured by chlorophyll a levels).
- Address the sediment impairment in the tidal Corsica River and reduce suspended sediment levels to meet Use II - Shallow Water criteria for water clarity due to excess turbidity
- Address the bacterial impairment in the tidal Corsica River and reduce bacterial levels to meet Use II – Shellfish Harvesting criteria and minimize any human-source bacterial levels that would permit shellfish harvesting in available waters (excepting permanently-closed WWTP discharge safety zone).
- Address the toxic impairments in the non-tidal waters of the Corsica River watershed to meet Use I criteria and improve necessary water and habitat quality issues so that aquatic life communities will meet reference conditions.
- Address the biological impairments in the non-tidal waters of the Corsica River watershed to meet Use I criteria and improve necessary water and habitat quality issues so that aquatic life communities will meet reference conditions.

To help achieve these goals, monitoring efforts are needed to track progress in reducing pollutant inputs and assess levels of use support – efforts which require continuation and expansion of some on-going monitoring efforts as well as adding several new elements. On a goal-by-goal basis, these efforts should include:

Tidal Water Quality Monitoring Program Costs

Goal: Continuous monitoring and water quality mapping to assess water quality criteria support and restoration impacts.

- MDE should maintain wastewater treatment plant discharge monitoring activities to measure point source contributions.
- DNR will assess criteria support in tidal river attributed to nutrient pollution by examining dissolved oxygen, chlorophyll levels, nutrients, and turbidity with a new long-term monitoring station, two continuous monitors and dataflow mapping.

Water quality monitoring costs:

- Two continuous monitoring sites, (4 YSI 6600EDS con. monitors: Total $42,600)
- Monthly water quality mapping (April through October)
- Field Staff (2 grade 12, 50% w fringe)
- Contractual services (nutrient analysis for 2 Continuous monitoring stations, 5 Water quality mapping calibration stations)
- Supplies

Year 1; **$105,000**
Year 2; **$ 65,000**
Year 3; **$ 68,000**
Year 4; **$ 72,000**
Year 5; **$ 75,000**
Total $385,000

- Possible Sources of Funding: $42,600 for continuous monitors for year 1, water quality mapping and salary for year 1 through year 5 through existing funding.

SAV and Water Quality Project Analysis/Oversight Costs

Goal: Provide one staff for data management, data analysis and project oversight, plus software and data processing gear.

Project Oversight costs:

- One FTE (Grade 15) for project oversight, data management, analysis.
- Software and data processing gear

Year 1; **$ 66,000**
Year 2; **$ 69,000**
Year 3; **$ 72,000**
Year 4; **$ 75,000**
Year 5; **$ 79,000**
Total $361,000

- Possible Sources of Funding: $62,000/year for 2006, 2007 from NOAA for Large-scale Restoration

The non point source evaluation will provide both short term and long-term measures of progress for this project. Short-term products will include tracking nutrient concentrations in shallow ground water to determine the impact of cover crops and nutrient management, annual nutrient surveys in the watershed and GIS tracking of program participation. Long-term products will include tracking nutrient and sediment loads being discharged to the Corsica River, habitat and living resource evaluations before and after stream restoration and wetland restoration activities.

Estimated budget for evaluation of non-tidal impairments and restoration activities

Initial year (Includes some nonrecurring equipment expenses)

Nutrients – Paired watershed

Weekly nutrient sampling (composite and grabs) at 4 sites
60 man days @ $200/day…… $12,000
Sample analysis full nutrients and sediment
220 samples @ $45 ea……..….... 9,900
Equipment – automated samplers, level loggers, etc…….. 20,000
Data analysis and report generation
20 man days @ $200/day…… 4,000

Biological and habitat at 4 sites

Fish
20 man days @ $200/day……. 4,000
Macroinvertebrates (assumes in-house processing and ID)
20 man days @ $200/day……. 4,000
Targeted Habitat Assessment
20 man days @ $200/day…….. 4,000
Bacteria Source Tracking (field collections one year only)
60 man days @ $200/day……..12,000
Equipment (Assumed use of some existing equipment)
Misc. nets, jars, preservatives, tapes, hipchains, etc……... 5,000
Data analysis and report generation
20 man days @ $200/day…….. 4,000

Transportation

500 miles/week @ $0.36/mile…….…… 10,000

TOTAL $88,900

Subsequent years

Nutrients – Paired watershed

Weekly nutrient sampling (composite and grabs) at 4 sites
60 man days @ $200/day…… $12,000
Sample analysis full nutrients and sediment
220 samples @ $45 ea……..…….... 9,900
Equipment maintenance……. ……..… 3,000
Data analysis and report generation
20 man days @ $200/day……. 4,000

Biological and habitat at 4 sites

Fish

20 man days @ $200/day……. 4,000

Macroinvertebrates (assumes in-house processing and ID)

20 man days @ $200/day……. 4,000

Targeted Habitat Assessment

20 man days @ $200/day…….…. 4,000

Bacteria Source Tracking (laboratory analysis, 1 yr only)

Prorated contract……..…….…...63,000

Equipment maintenance……...…… 1,000

Data analysis and report generation

20 man days @ $200/day……. 4,000

Transportation

500 miles/week @ $0.36/mile…….……...…… 10,000

TOTAL **$118,900**

Two year total……$207,800

Five year total……$375,500

Evaluation Funding Gap Analysis

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Program Coordination						
Project Coordinator	$75,000	$75,000	$75,000	$75,000	$75,000	$375,000
Sub-Total Funding Available						
Sub-Total Funding Needed	$75,000	$75,000	$75,000	$75,000	$75,000	$375,000
Tidal Monitoring						
SAV Monitoring	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Water Quality Monitoring	$105,000	$65,000	$68,000	$72,000	$75,000	$385,000
Project Analysis	$66,000	$69,000	$72,000	$75,000	$79,000	$361,000
Oyster monitoring	$6,000	$6,000	$6,000	$6,000	$6,000	$30,000
Sub-Total Total Costs	**$197,000**	**$160,000**	**$166,000**	**$173,000**	**$180,000**	$876,000
Sub-Total Funding Available	$172,000	$132,000	$56,000	$59,000	$62,000	$481,000
Sub-Total Funding Needed	$19,000	$22,000	$120,000	$140,000	$144,000	$445,000
Non Point Source monitoring						
Imagery and data acquisition for implementation tracking	$90,000	$90,000				$180,000
Flow monitoring	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
Grid soil sampling for P	$50,000	$50,000				$100,000
Soil pore nitrogen sampling	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Shallow ground water	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Storm water sampling	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Weekly nutrient sampling (composite and grabs) at 4 sites60 man days @ $200/day	$12,000	$12,000	$12,000	$12,000	$12,000	$60,000
Sample analysis full nutrients and sediment 220 samples @ $45 ea	9,900	9,900	9,900	9,900	9,900	49,500
Equipment – automated samplers, level loggers, etc	20,000					20,000

Data analysis and report generation 20 man days @ $200/day	4,000	4,000	4,000	4,000	4,000	20,000
Fish 20 man days @ $200/day	4,000	4,000	4,000	4,000	4,000	20,000
Macroinvertebrates (assumes in-house processing and ID) 20 man days @ $200/day	4,000	4,000	4,000	4,000	4,000	20,000
Targeted Habitat Assessment 20 man days @ $200/day	4,000	4,000	4,000	4,000	4,000	20,000
Bacteria Source Tracking (field collections one year only) 60 man days @ $200/day	12,000	63,000				75,000
Equipment (Assumed use of some existing equipment) Misc. nets, jars, preservatives, tapes, hipchains, etc	5,000					5,000
Data analysis and report generation 20 man days @ $200/day	4,000	4,000	4,000	4,000	4,000	20,000
Transportation 500 miles/week @ $0.36/mile	10,000	10,000	10,000	10,000	10,000	50,000
Sub-Total Total Costs	$388,900	414,900	$211,900	$211,900	$211,900	$1,439,500
Sub-Total Funding Available	44,000	95,000	32,000	32,000	32,000	235,000
Sub-Total Funding Needed	$344,900	$319,900	$179,900	$179,900	$179,900	$1,204,500
Total Total Costs	$660,900	$649,900	$452,900	$459,900	$466,900	$2,690,500
Total Funding Available	$216,000	$227,000	$88,000	$91,000	$94,000	$716,000
Total Funding Needed	$438,900	$416,900	$374,900	$394,900	$398,900	$2,024,500

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Appendices And Exhibits

Appendix A: Watershed selection criteria.

MDE8DIGT	MDE8NAME	ACRES	MDE6NAME	1	2	3	4	5	6	7			
			Codes at the bottom of the table	BNR	WRAS Year	UWA	# MDE impairments	TMDL	SAV **	BRP	% URB	% TAG	% FOR
02050301	Conewago Creek	3394	Conewago Creek								14	55	31
02120201	L Susquehanna River	24421	Lower Susquehanna River							2	28	29	43
02120202	Deer Creek	93168	Lower Susquehanna River							2	11	57	32
02120203	Octoraro Creek	22244	Lower Susquehanna River							3	12	55	32
02120204	Conowingo Dam Susq R	14779	Lower Susquehanna River							2	15	33	52
02120205	Broad Creek	26124	Lower Susquehanna River							1	9	56	35
02130101	Atlantic Ocean	59402	Coastal Area							1	46	0	0
02130102	Assawoman Bay	12803	Coastal Area							1	29	27	19
02130103	Isle of Wight Bay	41123	Coastal Area		1	PI	2	A, 5sites (N&P)		4	17	41	37
02130104	Sinepuxent Bay	13711	Coastal Area		3	CI	1			4	11	18	31
02130105	Newport Bay	32493	Coastal Area		3	PI, C3	1	T, (N,BOD)		2	7	37	42
02130106	Chincoteague Bay	89301	Coastal Area		4	CI, S 3	2	A(P)		4	1	32	41
02130201	Pocomoke Sound	46075	Pocomoke River	C						3	2	27	44
02130202	Lower Pocomoke River	101358	Pocomoke River	P				T4 (nuts)		3	4	36	58
02130203	Upper Pocomoke River	95602	Pocomoke River	P				pond + T4 (nuts)		4	2	45	53
02130204	Dividing Creek	39701	Pocomoke River					T3 (nuts)		4	0	21	78
02130205	Nassawango Creek	43877	Pocomoke River					T4 (nuts)		2	2	26	72
02130206	Tangier Sound	89650	Pocomoke River	D						3	13	6	8
02130207	Big Annemessex River	29820	Pocomoke River							3	3	28	43
02130208	Manokin River	74314	Pocomoke River		1	P1 C3	2	A (BOD,N)		2	4	30	46
02130301	Lower Wicomico River	79774	Nanticoke River	?				A0 (bod,N,P)		4	17	34	38
02130302	Monie Bay	29581	Nanticoke River							4	2	19	46
02130303	Wicomico Creek	19963	Nanticoke River					A0 (NP)a0 (np)		2	3	38	55
02130304	Wicomico River Head	24994	Nanticoke River	D,D,				A99 (lake P) & A0 BOD,NP)		3	17	40	42
02130305	Nanticoke River	127786	Nanticoke River							4	3	38	43
02130306	Marshyhope Creek	78915	Nanticoke River	D,D,P				A0 (P)		3	4	54	38
02130307	Fishing Bay	130092	Nanticoke River							4	1	15	41
02130308	Transquaking River	70934	Nanticoke River					A99 (NP)		2	1	46	36
02130401	Honga River	52740	Choptank River							4	4	9	34

02130402	Little Choptank	69688	Choptank River							1	3	34	50
02130403	Lower Choptank	195697	Choptank River					S2 (BOD,P)	C/SP-RH	3	11	60	26
02130404	Upper Choptank	163708	Choptank River		2	P1 C3	4			4	6	60	31
02130405	Tuckahoe Creek	98290	Choptank River							4	2	69	27
02130501	Eastern Bay	52069	Chester River						C- 2 SITES	4	25	49	21
02130502	Miles River	34862	Chester River	D						3	12	56	30
02130503	Wye River	57001	Chester River							4	4	70	26
02130504	Kent Narrows	12647	Chester River							4	25	40	28
02130505	Lower Chester River	82250	Chester River							3	7	55	29
02130506	Langford Creek	27029	Chester River					A?2 (eutro)		4	4	69	26
02130507	Corsica River	25298	Chester River	C	3	P1 C3	4	A (N& P)	PR/WC-SPRH	4	6	65	28
02130508	Southeast Creek	35458	Chester River					S2 (P)		4	2	67	30
02130509	Middle Chester River	39954	Chester River	D	1	P1 C3	4	T4 (nuts) Lake (P)		4	8	77	12
02130510	Upper Chester River	87992	Chester River		4		1?	S(nuts,mercury)		4	3	64	33
02130511	Kent Island Bay	5756	Chester River							3	33	43	17
02130601	Lower Elk River	32463	Elk River							4	7	42	46
02130602	Bohemia River	29714	Elk River					A1(NP)		1	3	73	24
02130603	Upper Elk River	22236	Elk River							2	22	21	54
02130604	Back Creek	9515	Elk River							3	9	48	37
02130605	Little Elk Creek	15731	Elk River							2	16	50	34
02130606	Big Elk Creek	10947	Elk River							1	11	48	40
02130607	Christina River	5319	Elk River							1	26	52	22
02130608	Northeast River	44426	Elk River	C				S3 (nuts)		2	15	39	45
02130609	Furnace Bay	14100	Elk River							2	10	45	44
02130610	Sassafras River	56944	Elk River					A3 (P)		1	4	68	26
02130611	Stillpond-Fairlee	40916	Elk River					A99 (NP) A1 (NP)		4	6	62	30
02130701	Bush River	45838	Bush River		2	P1	5	T3 (P)	C/WC	4	24	22	48
02130702	Lower Winters Run	8469	Bush River					T3 (lake P)		3	37	21	39
02130703	Atkisson Reservoir	29077	Bush River							2	27	44	29
02130704	Bynum Run	14584	Bush River							3	47	38	14
02130705	Aberdeen Proving Ground	21626	Bush River							3	41	1	42
02130706	Swan Creek	16863	Bush River					A1 (NP)		2	30	34	35
02130801	Gunpowder River	24985	Gunpowder River							3	38	6	41
02130802	Lower Gunpowder Falls	29240	Gunpowder River							1	33	32	34

02130803	Bird River	17737	Gunpowder River							3	43	16	38
02130804	Little Gunpowder Falls	37341	Gunpowder River							3	21	45	34
02130805	Loch Raven Reservoir	140940	Gunpowder River					T3 (nuts)		2	20	42	38
02130806	Prettyboy Reservoir	46457	Gunpowder River					T5 (nuts)		3	10	52	37
02130807	Middle River - Browns	9448	Gunpowder River							3	63	6	29
02130901	Back River	39129	Patapsco River		BA CO			T4 (N,P)	Pa/WC	2	77	3	18
02130902	Bodkin Creek	6580	Patapsco River							3	42	5	52
02130903	Baltimore Harbor	74901	Patapsco River		BA CO			T5(N,P)		2	76	2	20
02130904	Jones Falls	37283	Patapsco River							2	71	10	19
02130905	Gwynns Falls	41712	Patapsco River							2	75	6	18
02130906	Patapsco River L N Br	75758	Patapsco River		4	C1, S3	4	A (Nutrients)		3	42	13	43
02130907	Liberty Reservoir	104805	Patapsco River		2	P1, C3	4	A (mercury)		1	19	48	33
02130908	S Branch Patapsco	54940	Patapsco River					S4 (lake P)	Pa/WC	3	18	50	32
02131001	Magothy River	28443	West Chesapeake Bay							2	61	6	33
02131002	Severn River	51746	West Chesapeake Bay							1	47	11	41
02131003	South River	42296	West Chesapeake Bay						PR/SP-RH	1	29	20	51
02131004	West River	19866	West Chesapeake Bay							2	18	36	45
02131005	West Chesapeake Bay	52923	West Chesapeake Bay							2	20	15	62
02131101	Patuxent River lower	240453	Patuxent River		3	C1, S3	3	S(lake mercury)	C/E 4 sites	1	15	26	57
02131102	Patuxent River middle	56034	Patuxent River							2	13	35	47
02131103	Western Branch	71420	Patuxent River		3	P1,C3	2	A(BOD)		3	34	26	39
02131104	Patuxent River upper	56448	Patuxent River		4	P1	5	S '04(lake mercury)		3	31	22	46
02131105	Little Patuxent River	66217	Patuxent River		1	P1 C3	4	A(lake nuts, sediment)		3	49	13	37
02131106	Middle Patuxent River	37075	Patuxent River							3	27	40	33
02131107	Rocky Gorge Dam	34210	Patuxent River		WSSC& Cos			T5 (nuts)		2	26	36	37
02131108	Brighton Dam	50597	Patuxent River		WSSC& Cos			T5 (nuts)		3	14	53	32
02139996	Upper Chesapeake Bay	62158	Chesapeake Bay (proper)							3	20	2	40
02139997	Middle Chesapeake Bay	97906	Chesapeake Bay (proper)							1	1	0	21
02139998	Lower Chesapeake Bay	535522	Chesapeake Bay (proper)							1	1	0	1
02140101	Potomac River L tidal	248684	Lower Potomac River						C/E	1	12	33	52
02140102	Potomac River M tidal	47766	Lower Potomac River	P						1	9	9	79
02140103	St. Mary's River	54644	Lower Potomac River		NGO			A? (lake eutro)	C/E	1	13	25	61
02140104	Breton Bay	38452	Lower Potomac River	C	2	P1 C3	4	T5 (nuts)		1	11	26	61

02140105	St. Clements Bay	33259	Lower Potomac River							3	7	41	51
02140106	Wicomico River	61011	Lower Potomac River							1	7	37	51
02140107	Gilbert Swamp	27758	Lower Potomac River							2	8	34	58
02140108	Zekiah Swamp	69906	Lower Potomac River							1	15	24	60
02140109	Port Tobacco River	30102	Lower Potomac River					A98 (NP)		2	19	21	59
02140110	Nanjemoy Creek	49325	Lower Potomac River							2	7	16	74
02140111	Mattawoman Creek	62194	Lower Potomac River	D				S3 (NP)		1	22	14	63
02140201	Potomac River U tidal	36256	Washington Metropolitan							3	51	7	40
02140202	Potomac River MO Cnty	88228	Washington Metropolitan							1	33	37	30
02140203	Piscataway Creek	44479	Washington Metropolitan							3	34	16	48
02140204	Oxon Creek	6891	Washington Metropolitan							3	73	3	24
02140205	Anacostia River	92743	Washington Metropolitan		4	P1 C3	7			2	65	8	27
02140206	Rock Creek	39269	Washington Metropolitan					A2 (2 lakes eutro)		3	70	12	17
02140207	Cabin John Creek	16425	Washington Metropolitan							2	83	0	16
02140208	Seneca Creek	82741	Washington Metropolitan	C,D				A1 (Clopper Lake P)	C/WC	2	25	46	29
02140301	Potomac River FR Cnty	43102	Middle Potomac River							4	9	58	34
02140302	Lower Monocacy River	194692	Middle Potomac River		3	P1 S3	2	A(lake Phos, sed)		2	15	59	26
02140303	Upper Monocacy River	156505	Middle Potomac River		4	P1 S3	4	S? (bacteria)		4	6	58	36
02140304	Double Pipe Creek	123402	Middle Potomac River							4	10	73	17
02140305	Catoctin Creek	77066	Middle Potomac River	P						2	7	60	32
02140501	Potomac River WA Cnty	58299	Upper Potomac River							4	9	42	49
02140502	Antietam Creek	118774	Upper Potomac River					WQA (CBOD & NBOD)		1	16	57	26
02140503	Marsh Run	13461	Upper Potomac River							4	18	69	14
02140504	Conococheague Creek	41737	Upper Potomac River					2000 De-List		2	16	66	17
02140505	Little Conococheague	10721	Upper Potomac River							4	6	56	38
02140506	Licking Creek	17720	Upper Potomac River							2	2	21	77
02140507	Tonoloway Creek	1338	Upper Potomac River							1	10	23	67
02140508	Potomac River AL Cnty	32552	Upper Potomac River							1	1	11	88
02140509	Little Tonoloway Creek	9885	Upper Potomac River							1	5	32	63
02140510	Sideling Hill Creek	14138	Upper Potomac River							1	0	20	79
02140511	Fifteen Mile Creek	33174	Upper Potomac River							1	1	6	94
02140512	Town Creek	43412	Upper Potomac River							1	1	19	80
02141001	Potomac River L N Branch	73148	North Branch Potomac River							1	11	13	77
02141002	Evitts Creek	19955	North Branch Potomac River		AL CO draft			A99 (lake P)		1	14	16	70

02141003	Wills Creek	38432	North Branch Potomac River						1	16	10	74
02141004	Georges Creek	47696	North Branch Potomac River	P	1	P1, S3	4	??	1	18	12	70
02141005	Potomac River U N Branch	67628	North Branch Potomac River						2	9	16	75
02141006	Savage River	74540	North Branch Potomac River					??	1	2	15	83
05020201	Youghiogheny River	141152	Youghiogheny River						1	4	31	64
05020202	Little Youghiogheny R	26216	Youghiogheny River					A99 (Lake P)	1	7	39	54
05020203	Deep Creek Lake	40938	Youghiogheny River						2	13	24	61
05020204	Casselman River	58589	Youghiogheny River					WQA? (eutro)	1	4	27	68
									1			

Codes:

BNR	C= construction	soon	Biological Nutrient Removal
	P= Plan	later	
	D= Design	much later	
WRAS	1=2001, 2=2002, etc		Watershed Restoration Strategy
UWA	P= priority I, II, etc		Unified Watershed Assessment
	C= category 1, 2, etc		
	S= select 1,2, etc		
# MDE impairments	number = number of pollutants listed		less is better
TMDL	a= approved, # = year 1=2001		Total Maximum Daily Load
	s= scheduled		may be multiples/ watereshed
	t= tentative		may only apply to part of WS
	nuts= nutrients		
	WQA+ ??		

Under "SAV_activity"	C= Current = SAV has been planted/seeded in 2004
	pr= Proposed = SAV will be planted/seeded by Spring 2005
	pa= Past = SAV was planted in 2003 and the site survived
Under "SAV_Species"	WC = Wild Celery (freshwater to oligohaline)

	SP = Sago Pondweed (Mesohaline)
	RH = Redhead Grass (Mesohaline)
**	E = Eelgrass (Meso to Polyhaline) These are the only relatively "large" plantings (~ 50 acres)

BRP	Bay Restoration Potential - A composite indicator based on potential for water quality improvement (4 = highest potential, 1 = lowest potential)

Appendix B.Biological Impairment

The major impediment is lack of regulatory process for removing biological impairments from 303d list. MDE & EPA indicate a multi-year process will be needed to address several critical components prior to any practical application of the biostressor concept. They include better definition of management objectives, establish an achievable data set (STORET?), refine species tolerance criteria (build table of tolerance values), compilation of the decision matrix, establish a functional relational database (ADB?), and
develop weight-of-evidence and threshold criteria for the diagnosis section of the MDE model.

In the meant time, the following outline provides a process to move current effort forward. It is based on experience gathered through the original Targeted Watersheds Projects and the WRAS's.

Biological impairments
- Indicators
- Stressors
- "solutions"

1. IBI's based on selected MBSS surveys
   - Fish, IBI scores are all very good.
   - Benthic Macroinvertebrates IBI's at the same stations are quite variable.
   - Habitat scores not used directly, and results are equivocal.
2. Stressors – identify, quantify
   - Categories
     - Water Quality – chemistry
     - Water quantity – floods, droughts, stormwater discharges
     - Habitat
     - Cumulative impacts
   - Survey data available
     - Stream Corridor Assessment (SCAM)
       - 44 miles of streams & 24 miles of shoreline surveyed,
         323 observations
     - Synoptic Survey –
       - NPS nutrient hot spots: septic, ag
       - Ortho P – suspended sediment, possible stormwater impacts
       - Biota & habitat samples low benthics, degraded habitat
     - Additional MBSS data from other years
3. Solutions (implementation of BMPs), identify, quantify, prioritize, fund, implement, evaluate results, and repeat as needed. For biological impairments habitat appears to be primary factor

   - Coordinate with local WRAS implementation Team
   - Stream restoration
   - Stormwater management - new & retrofits
   - Ag conservation practices
   - Buffer plantings

Appendix C. Funding Sources

Brief Overview of Programs

Program	Purpose	Support/Funding
American Forests Global Re-Leaf (GRF)	Enhance the environment through tree plantings.	Technical assistance and cost share funding. Funds are generally for the costs associated with planting seedlings (including site preparation, seedling purchase, contracting, shelters). Successful proposals have seedlings costing between $.25 and $.50 a piece. Property owned by a government entity or public assisted private land. Project area must be on plantable land of 20 acres or more.
Backyard Conservation Program	Adapts conservation practices commonly used on agricultural lands to suburban and urban yards.	Technical assistance.
Backyard Wildlife Habitat Program	Encourages homeowners to garden for wildlife.	Technical assistance; information kits, approved habitats are designated official NWF Backyard Wildlife Habitat Site.
Bayscapes	Promote landscaping management to reduce pollution and enhance wildlife habitat.	Technical assistance.
Buffer Incentive Program (BIP)	Establish and maintain streamside buffers around the Bay and it's tributaries.	One time payment of $300/acre with at least one acre and the maximum of 50, upon verification of 65% seedling survival rate after one year. A reduced payment of 50% is payable for a survival rate of 50% - 65%.
Chesapeake Bay Small Watershed Grants Program	A partnership between the National Fish and Wildlife Foundation, the EPA, and other Chesapeake Bay Program partners to promote small scale watershed restoration within the Chesapeake Bay watershed.	Funding from $5,000 to $50,000. In addition, five Community Legacy Grants of up to $100,000 are awarded annually. Develop or implement a local watershed management plan OR promote locally based protection and

		restoration efforts that complement watershed management strategies. Must link to a Chesapeake 2000 goal.
Chesapeake Bay Trust	Promotes public awareness and participation in restoration and protection of the Chesapeake Bay.They offer grants for habitat restoration and protection as well as riparian and wetland plantings.	Grants $1.00 - $2,000 reviewed on-going 4-6 weeks in advance of needing funds. Grants $2,000 - $25,000 are reviewed on a quarterly basis. Grants $25,000 - $50,000 RFP on annual basis.
Chesapeake Wildlife Heritage	Non-profit organization dedicated to creating, restoring, and protecting wildlife habitat and establishing more sustainable agriculture in the Chesapeake Bay watershed.	Technical assistance and project labor; CWH helps public and private landowners with habitat/wetland construction and finding funding for sustainable agriculture practices.
Clean Water Action Plan Nonpoint Source Program (319 Grant)	Support the goals of the 1998 CWAP through funding on the ground implementation of nonpoint source activities to improve water quality and aquatic and habitat health.	Funds are pending Congressional approval; FY 2001 funding was $1.1 million with hopes of funding 15 projects. Funding range is $5,000 - $40,000. Non-profit organizations are limited to a maximum of $25,000 unless they are partnered with a state, county, or local jurisdiction.
Conservation Reserve Program (CRP)	Implement conservation practices on crop and pastureland by taking land out of production for 10-15 years thereby improving water quality and wildlife habitat.	Annual rental payments or cost-share payments; Rental payments not to exceed $50,000/yr. Encourages wetland restoration by offering 25% of incurred costs in addition to 50% cost-share provided to establish approved cover.
Conservation Reserve Enhancement Program (CREP)	Maryland specific enhancement of CRP. Goal is to enroll 100,000 acres statewide.	Eligible farmers receive one-time sign up bonus of $200 to $250 per acre depending on life of contract. Annual rental payments equal the cost per acre plus incentive payments from 75% to 100% per acre cost depending on type of buffer panted. Cost share funding available through other programs (see website) for installation of BMP's

		(stream fencing, water troughs, stream crossings, etc.) on land enrolled in CREP. Some BMP's are eligible for 40% bonus from USDA. Up to $10 per acre maintenance fee for life of contract.
Environmental Quality Incentives Program (EQIP)	Implement conservation practices and BMP's on land involved with livestock and crop production.	Cost-share and incentive payments for conservation practices; technical assistance provided; Cost-sharing pays up to 75% of certain conservation practices, and incentives are given to perform land management practices; Total payments do not exceed $10,000/yr or $50,000 for length of contract.
FishAmerica Foundation (American Sportfishing Assoc.) and NOAA Fisheries Community Based Restoration Partnership	Restoration of marine, estuarine, and riparian habitats.	Non-matching funding up to $30,000, but match strongly encouraged, technical assistance.
Five Star Restoration Challenge Grants	Restore riparian buffers and wetlands - emphasis on community partnerships contributing to projects.	Funding; Grants from $5000 and $20,000. Awarded to any public or private entity eligible and must include diverse partnerships and include education, outreach and community stewardship.
Freshwater Mussel Fund	Enhancement and protection of freshwater mussel resources and restore mussel shell populations allegedly affected by illegal acts.	Funding which resulted from a settlement agreement. Remaining funds are being held for state law enforcement use, especially those states involved in mussel investigations.
Maryland Agricultural Water Quality Cost-Share Program (MACS)	Helps farmers protect natural resources on their farms, maintain farm productivity, and comply with a growing number of federal and state environmental requirements.	Grants cover up to 87.5% of the cost to install BMPs.Animal waste/containment projects - up to $75,000/farm with max. of $100,000 when combined with other BMP's. All other BMP's, Up to $20,000/project with max. of $50,000/farm. Up to $40,000 available when pooling project between 2 or more farms.
Maryland Environmental Trust (MET)	Promote growth management through	Provide contacts of local land trusts, puts land into

	donation of conservation easements protecting farmland, forestland, wildlife habitat, waterfront, significant natural areas, historic sites and scenic properties.	conservation easements; 4 programs available, Conservation Easements, Local Land Trust Assistance, Rural Historic Village Protection, Keep Maryland Beautiful.
Maryland Nontidal Wetlands Mitigation Program	Regulates impacts on non-tidal wetlands by development and promotes conservation of existing wetlands.	Technical assistance and up to 100% funding available for nontidal wetland restoration, enhancement and creation.
Maryland Waterfowl Restoration Program	Increase and improve waterfowl habitat conservation on private lands through tax incentives.	Technical assistance; DNR inspects the project each year and provides the licensee with a form for tax purposes.
National Coastal Wetlands Conservation Grant Program	In support of the Coastal Wetlands Planning, Protection, and Restoration Act provide funding to enhance, restore and manage coastal wetlands.	Cost-share funding; States provide 50% of match, if state has established and maintains special funds for coastal wetlands federal share may increase to as high as 75%.
National Fish and Wildlife Foundation Challenge Grant	Provides challenge grant money to organizations addressing habitat protection and restoration on public and private lands.	Matching funds; dollar to dollar match; matches must follow the following rules: non-federal, derived from sources other than that of the grantee, dedicated specifically for the project.
National Fish and Wildlife Foundation, NRCS, NACD Challenge Grant for Conservation on Private Lands	Provide challenge grant money to private landowners, specifically farmers and ranchers, to support wildlife habitat and conservation of natural resources.	Matching funds; 2 to 1 match: matches must follow the following rules: non-federal, derived from sources other than that of the grantee, dedicated specifically for the project.
NOAA Community-Based Restoration Program (CRP)	“One stop shop” for information about fish habitat restoration funding opportunities from a variety of organizations,	Varies with program.
Shore Erosion Control	Address shoreline and streambank erosion through a variety of protection and habitat restoration methods, including structural and non-structural components.	Technical assistance and financial assistance for project implementation. 100% interest-free loans for local government sponsored projects of any type on community or public lands; 75% interest-free loans, NTE $25,000, for non-structural projects on private or community property.
North American Wetlands Conservation Act (NAWCA) Standard and Small Grants	Provide funding to conserve wetland ecosystems.	Matching funds; 1:1 cost share of non-federal match for habitat and wetland

Programs		enhancement.
Partners for Fish and Wildlife	Restoring cleared, drained or degraded wetlands (fresh and saltwater), streamside areas, and fish and wildlife habitats on private lands.	Funding of restoration work, technical assistance; Program does not require but encourages a dollar for dollar cost-share.
Reforestation Income Tax Modification Program	Provide tax incentives to forest landowners to manage their forestland.	Income tax incentive; allows participants to deduct double the amount of reforestation or timber stand improvement costs from state income tax returns (less any cost-share assistance received from other programs).
Rural Legacy	Protects natural resources, farms, forests, and other sensitive environmental areas while maintaining the viability of resource-based economies and the proper management of tillable and wooded areas.	Grants to local government and land trusts to conserve land in designated Rural Legacy Areas.
Saltonstall-Kennedy Program	Increase the environmental and economic health and productivity of commercial and recreational fisheries.	Budget pending Congressional approval; non-federal match may be required; must not exceed 50% of total budget. Recent solicitations have included a cost share of 10% of total costs.
Small Creeks and Estuary Water Quality Restoration Program	Provide financial assistance to local government for implementing restoration efforts that provide water quality and habitat improvements to streams and estuaries.	Grant funding can cover up to 50% of the eligible costs of design and construction; local government must provide matching funds and/or in-kind services. Funding range: $20,000 - $500,000.
State Water Quality Revolving Loan Fund	Assist local government in financing water quality improvement projects for both point and nonpoint source pollution and to insure compliance with federal and state water quality requirements.	Funding and technical assistance, low interest rate loans.
Stormwater Pollution Cost Share Program	Provide financial assistance to local government for implementing stormwater management retrofits and conversions to control the load of nutrients and pollutants entering the state's waterways.	Funding and technical assistance; grant funding can cover up to 75% of the eligible costs of design and construction; local government must provide matching funds and/or in-kind services. Funding range: $20,000 to $500,000.

Stream ReLeaf	Strives to reach statewide goal of 600 miles of riparian buffers by 2010.	Technical assistance; Stream ReLeaf will help design buffer plan, coordinate volunteers and locate incentive programs.
Town Creek Foundation	Preserve natural resources with an emphasis on estuaries and coastal lands in the Mid-Atlantic and federal public lands, also specific focus on environmental preservation on Talbot County, MD.	Non-match funding. Funding range: $10,000 - $100,000; average $30,000.
Tree-Mendous Maryland	Workshops for communities interested in the program; technical expertise, availability of native trees and shrubs at reasonable prices; recognition of community efforts through PLANT awards (People Loving and Nurturing Trees).	Native trees and shrubs can be purchased through the program. The **Gift of Trees** allows participants to purchase the gift of a tree for $25.00.
Wal-Mart Environmental Grant	Address local environmental concerns that will provide a long-term community value.	Non- match funding. Funding range: $500.
Watershed Assistance Grants	Support the growth and sustainability (i.e., organizational capacity) of local watershed partnerships in the United States. For the purpose of this program, a “watershed Partnership” is defined as an inclusive, enduring, diverse, community-based group organized to identify and resolve watershed problems and issues.	Funding up to $30,000.
Wetlands Reserve Program (WRP)	Secure conservation easements and provide cost-share assistance to restore, protect and enhance wetlands and eligible buffers.	Provides funds for permanent easements and cost-share assistance for wetland restoration; Permanent easement payment of less than value of land, established cap or landowner offer and 100% of the restoration costs; Thirty year easement payment is 75% of that a for permanent easement and 75% of the restoration costs; ten-year cost share offers 75% of restoration costs.
Wildlife Habitat Incentives Program (WHIP)	Development or restoration of wildlife habitat, can also	Provides funding and technical assistance for

	be used on aquatic habitat, adjacent streambanks and uplands on primarily private lands.	installing wildlife habitat and, preparing habitat development plan; Cost share with NRCS providing 75% of the cost for installing the habitat, can be used in conjunction with larger conservation plan.
Wildlife Links	Protect and enhance wildlife, fish and plant resources on golf courses.	Funding and technical assistance; $200,000 available annually for projects.
Woodland Incentive Program (WIP)	Provide cost sharing assistance for tree planting, site preparation and timber stand improvement practices.	Cost-share funding. WIP pays up to 50% for tree planting, site preparation and timber stand improvement.